

FEDERATION OF MALAYA

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE YEAR

1953

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SECTION I

POLICY

The agricultural policy of the Federation has remained unaltered; expansion of locally grown food supplies—particularly of rice, diversification of crops, the replanting of old rubber and the maintenance of soil fertility are the bases of this policy. In so far as the Department of Agriculture is a key instrument in giving effect to this policy two problems arise: what are the improved technical methods that should be adopted by the farming community; how can the farming community be persuaded to adopt these improved technical methods? The first problem is one of research and investigation, the second of extension. Extension, because it is dealing with human beings with their vagaries, inconsistencies and reluctance to conform to rigid procedures, is often the more difficult problem to solve.

2. In Malaya, the term Department of Agriculture embraces no less than 12 Departments of Agriculture—one Federal, two Settlement and nine State. Each Department is financed separately by its relevant Government. On the principle of he who pays the piper calls the tune, there is the obvious risk that the implementation of an agricultural policy for the whole Federation might be thwarted by disintegration into 12 separate policies. That this has been, in the main, so happily avoided is due partly to the terms of the Federation Agreement which lays down that agricultural research is the function of the Federal Government, partly to the liaison and co-ordination between all twelve Departments by the Headquarters staff of the Federal Agricultural Department at Kuala Lumpur, and partly to the common sense of all those whose duty it is to further the progress of agriculture in Malaya.

ORGANISATION OF THE DEPARTMENT

3. The Federation of Malaya Agreement, placing on the Federal Government responsibility for agricultural research and investigations, implies that the 11 State and Settlement Governments will take care of agricultural extension activities through their Departments of Agriculture. Unfortunately the distinction between research or investigation and extension is not always quite clear; for example, are the vitally important soil surveys a State responsibility or Federal? A further complication during the past few years has been the acute shortage of staff in both Federal, State and Settlement Agricultural establishments. Suffice it to say that every endeavour has been made to make the best use of the limited staff irrespective of the terms of the Agreement. The confidence with which padi fertiliser is now advocated in the northern States of Malaya is the direct result of the investigations undertaken by the staffs of the respective State Departments of Agriculture. The co-operation shown by State and Settlement Governments in accepting the responsibility for such investigations

is greatly appreciated and has undoubtedly advanced by several years the date at which specific fertilisers could be recommended.

4. With the rapid filling of the Senior establishments in 1953 and the anticipated completion of these establishments in 1954 and 1955, the opportunity will be taken of relieving State and Settlement Agricultural Departments of investigational work. These Departments will then be able to devote their attention entirely to extension activities, serving the agricultural needs of the farming communities within their territorial boundaries. To achieve this, it will be necessary to post Federal Agronomists to those States and Settlements in which agricultural research and investigations are being undertaken. It was with this in view that the Agronomy Branch of the Federal Department was created in 1952.

5. During the year, uneasiness was felt in certain quarters that the resources devoted to agricultural research and investigations were disproportionately large in comparison with the somewhat similar resources devoted to extension activities. With expenditure on all 12 Departments of Agriculture never exceeding, each year since the Liberation, one per cent. of the total Government expenditure, it is obvious that great care must be taken to see that these strictly limited resources are used to the best advantage. The costly failures of agricultural development schemes, such as the Short Term Food Production Scheme in Malaya (originated shortly after the Liberation), clearly show the danger of attempting rapid development without preliminary research or investigations. Nevertheless, every endeavour has been made to expand extension activities, a description of which is given in Section IV, C of this report.

ASIANISATION

6. Within the senior posts of the Department, i.e., those which require full professional qualifications, only four Asians held appointment in 1953. There are, however, no fewer than eleven Asians training abroad under various Scholarship Schemes with the object of obtaining the necessary qualifications for entry into the professional cadres of the Department of Agriculture. These qualifications entail a degree in Agriculture or an honours degree in Natural Science, at a recognised university followed by two years post-graduate training. In certain instances, one year post-graduate training is considered adequate. Three Asians are expected to complete their training in 1954.

FINANCE

7. The deterioration of Malaya's financial position during the year was held to enforce drastic cuts in the 1954 Estimates of the Federal Department of Agriculture. Much thought was given as to how reductions in expenditure could be effected without seriously curtailing essential research and investigations. It appears inevitable that unless funds become available—possibly from the Colonial Development and Welfare Fund, or from similar outside sources—certain promising lines of work will have to be discontinued in 1954. Expenditure on the Federal Department of Agriculture is to be cut by no less than \$860,084 on its 1953 allocation of \$3,288,082. On the other hand, with the exception of one State which is estimating for a reduction of \$2,824, all

other State and Settlement Governments are making provision for increased expenditure on their Agricultural Departments for 1954.

8. For the steady achievement and development of results from a Department of Agriculture there are three essentials: adequate staff, adequate equipment and adequate finance. It is unfortunately true that this trinity is rarely operative at one and the same period. Malaya is no exception. Since the Liberation, equipment was first in critically short supply, but as procurement became easier staff shortages became acute. Now that equipment and staff are, or are becoming, adequate, finance is withering.

9. Improvements in agriculture cannot be made overnight. To obtain full value for the resources allocated to the improvement of agriculture there must be some certainty that adequate staff, equipment and finance are forthcoming for a period of years.

COLOMBO PLAN AID

10. During 1952, when the senior staff establishments were less than half filled, the opportunity offered by the Colombo Plan for the loan of specialist officers was warmly welcomed. Two such officers, both from Canada, accepted service with the Department and took up their duties in Malaya during the year. Dr. W. J. Cherewick, Plant Pathologist, is giving notable assistance in elucidating the causes of *penyakit merah* of padi and studying the diseases of other crops, while Dr. W. F. Grant, Botanist, is posted to Malacca for padi selection and breeding. Further Canadian specialists are expected to arrive in 1954.

STAFF

11. Twelve recruits were appointed to the Department during 1953 in addition to the two Colombo Plan specialists from Canada. At the end of the year 49 posts were filled out of a professional officer establishment—including that of the State and Settlement Departments—of seventy. Vacancies in the Agricultural Assistant establishment are still at the high level of 25 per cent. But the improvement initiated in 1953 in the terms of service of this important cadre has had the effect of popularising recruitment; intake to the Three-year Diploma Course at the College of Agriculture—an essential qualification for entry to the Agricultural Assistant Service Scheme—included the full quota of fifteen Government scholars.

12. The Junior Agricultural Assistant establishment is likely to play an increasingly important role within all branches of the Department. Formerly termed Agricultural Subordinates, these men require only a Standard V pass in a vernacular school and one year at the College of Agriculture—teaching being undertaken in the vernacular. But the rapidly raising standards of education throughout Malaya has meant that the type of man or youth now recruited as Junior Agricultural Assistant is of a very much higher educational calibre than before. He is able to undertake duties and responsibilities which previously were beyond his capabilities. The ratio of Junior Agricultural Assistants to Agricultural Assistants is at present only one and a half to one. It will be advantageous if this ratio can be gradually increased to three to one.

13. It is again my privilege to record the keenness and hard work performed by all members of the staff during a year characterised by many difficulties and frustrations.

SECTION II

AGRICULTURE IN THE FEDERATION OF MALAYA

A.—WEATHER

14. The weather followed the usual pattern in all parts of Malaya except in the north-eastern areas where the dry season was unduly prolonged. Normally, light rains commence in the north-east in September and increase steadily to an intensely wet period between November and the following January. In 1953 the rains did not commence until mid-November.

B.—CROP REPORTS

(i) RUBBER

15. Comparative acreages under rubber in the Federation are as follows:

Calendar Year		Estates (Acre)		Smallholdings (Acre)		Total (Acre)
1949	..	1,970,579	..	1,393,881	..	3,364,460
1950	..	1,964,370	..	1,393,881	..	3,358,251
1951	..	1,963,735	..	1,571,486	..	3,535,221
1952	..	1,996,727	..	1,616,093	..	3,612,820
1953	..	2,029,706	..	1,697,834	..	3,727,540

16. Production figures are given in the following table:

PRODUCTION (TON)

Calendar Year		Estates		Smallholdings		Total
1949	..	400,009	..	270,248	..	670,257
1950	..	375,853	..	316,732	..	692,585
1951	..	327,956	..	275,924	..	603,880
1952	..	341,078	..	241,571	..	582,649
1953	..	341,117	..	231,675	..	572,792

17. The Pan-Malayan imports and exports of rubber during the same periods were:

PAN-MALAYAN IMPORTS AND EXPORTS (TON)

Calendar Year		Gross Exports		Gross Imports		Net Exports
1949	..	899,212	..	220,141	..	679,071
1950	..	1,106,500	..	448,655	..	657,845
1951	..	1,155,277	..	547,107	..	608,170
1952	..	910,420	..	338,855	..	571,565
1953	..	847,212	..	277,532	..	569,680

18. The previous year, 1952, saw a heavy fall in the average price of rubber from \$1.40 per lb. for No. 1 R.S.S. in January to 75 cents in October and a rise to 90 cents per lb. at the end of the year. In contrast, 1953 was a year of steadily declining prices with only occasional, small, upward variations. The monthly average price of No. 1 R.S.S. fell from 85 cents per lb. in

January to 58 cents in December, 1953. Estate production again rose slightly compared with the previous two years, but there was a further decline, of approximately 4 per cent., in the production on smallholdings. These trends are likely to continue for some years to come. The extensive replanting programmes which have been pursued by most estates since the end of the war must result in an increase in total production, although progress may at times be clouded by either conservative tapping programmes or the further felling of old areas. In general, old rubber is being steadily replaced by new, high yielding strains. In contrast, smallholdings are subject to two factors both of which are likely to result in a falling production which will not be arrested for some years. The replanting programme will be responsible, in direct ratio to its success, for a fall in production, and the replantings cannot begin to influence production for at least another six years. The remaining areas are increasing in age, and this, in conjunction with indifferent tapping, is likely to accelerate the fall in production.

19. Reports from the States and Settlements show that the fall in rubber prices has not, in fact, been followed by substantial areas being left untapped. Production figures and other available evidence support this view. It would indeed be strange if neglect to tap occurred on a large scale, for rubber is often the main or only source of a cash income, and for the owner of a smallholding, of a size within his family's ability to tap, the cash expenses in tapping and processing are negligible.

20. The Administrators of Fund 'A', one of the funds provided under the Rubber Industry (Replanting) Fund Ordinance and which was described in the report for 1952, paid \$45,000,000 to the estates of more than 100 acres in area which had qualified for the repayment of their credits in the custody of the Administrators.

21. Under the Administrators of Fund 'B', a similar fund for smallholders, a new Smallholders' Replanting Organisation has been created which in most respects is comparable to a Government Department. The Organisation has been faced with a formidable task; during the period of its formation it had to be prepared to face a full field programme with a new staff that was only in process of recruitment and a *modus operandi* that was being created under the pressure of work that could not be delayed. The replanting target figure was set at 50,000 acres for 1953, whereas under Schemes 1 and 2, 15,792 applications were received for approval to fell 66,797 acres of old rubber trees. Out of this total, 13,485 applications, representing 46,914 acres, were approved, 7,289 applicants received payments on 23,865 acres and a further 766 applications, covering 2,442 acres were approved for grants but payments have not yet been made. Under Schemes 1 and 2 a total sum of \$2,891,263 has been paid to smallholders.

22. The target figure for the replanting of smallholdings remains at 500,000 acres over the first six years, which includes a target figure for each State and Settlement.

23. The response to the replanting schemes for smallholders has been greatest in those west coast areas which contain the largest concentration of early planted rubber and where, in general,

there is a scarcity of land for new planting. The total number of applications to replant received in Johore, Malacca, Negri Sembilan, Selangor and Perak cover an area greater than the 1953 target for these States and the Settlement. The significant figure, however, is the acreage on which a grant has been paid or approved, and this figure is about one-third of the acreage for which applications were received.

24. The replanting grant of \$400 an acre is also payable to smallholders who wish to establish approved crops other than rubber. During 1953, 543 acres of smallholders' old rubber have been felled and replanted with other crops, of which coffee, fruit trees and padi have proved the most popular.

25. New planting of rubber continued during the year and totalled 6,339 acres. Most of this new planting took place in Pahang, Kelantan, Trengganu, Kedah and Perak.

26. Colonial Development and Welfare Scheme No. D. 1176, which financed the production and supply of improved rubber material, was terminated in March, 1953. Under this Scheme, the Department of Agriculture was responsible for the production of planting material at a subsidised price for both new planting and replanting of rubber. This work is now financed from Fund 'B', but the Department has continued to be responsible for organising the production of the material. Clonal seedlings continued to be the most popular, but unlike former years the Department was able to meet the demand. Budwood nurseries have been established to supply planting material should clonal seedlings be insufficient at any time. The planting programme has been organised on a conservative basis of ensuring sufficient material to supply the full replanting target acreage in addition to requirements for new plantings. New sources of clonal seeds have been arranged, and the supply during the year was increased by 60 per cent.

27. Prices charged to the smallholder for budwood and clonal seedlings are estimated to cover costs; for clonal seedlings the price includes an item to meet transport costs to a point on the road nearest to the smallholders' land. The current price is 15 cents each for clonal seedlings and 25 cents per yard for budwood. At these prices planting material will cost approximately \$30 per acre, whether for clonal seedlings or for buddings.

(ii) RICE

28. In the 1952-53 season, the downward trend in the acreage planted to rice ceased and there was a slight increase in the acreage planted; there is evidence that the 1953-54 season will see a further small increase. The 1952-53 season was a year of very satisfactory yields in all the important rice-growing areas, and the estimated total yield was just short of the all-time record crop of the 1950-51 season when the acreage planted was significantly larger. The estimated average yield of wet padi was 1,966 lb. per acre compared with 1,551 and 1,876 lb. for the previous two seasons.

29. The minimum price fixed by Government remained, as during 1952, at 12 $\frac{3}{4}$ cents per lb. During the year, business was conducted at a price greater than this.

30. The following table gives comparative figures for acreages under wet and dry padi together with yields since 1948:

Season	WET PADI		DRY PADI		TOTAL PADI	
	Acreage (Planted)	Yield (Ton)	Acreage (Planted)	Yield (Ton)	Acreage (Planted)	Yield (Ton)
1948-49 ..	842,450	467,825	65,620	19,833	908,070	487,658
1949-50 ..	871,470	667,485	59,060	24,425	930,530	691,910
1950-51 ..	828,590	684,668	46,800	18,255	875,390	702,923
1951-52 ..	790,110	525,713	40,940	15,668	831,050	541,381
1952-53 ..	789,840	683,795	44,170	16,288	834,010	700,083

31. There has been no significant change in the relationship between production of rice in the Federation and the Pan-Malayan requirements.

32. The following table gives the figures for the production of rice in relation to the Pan-Malayan consumption and retained imports for the past five years:

	1949	1950	1951	1952	1953
Retained imports (ton) ..	495,029	435,958	498,929	423,008	494,365
Production (ton)	307,180	435,840	442,780	341,020	441,000
Consumption (ton) ..	802,209	871,798	941,709	764,028	935,365
Percentage of production to consumption	38	50	47	45	47

33. There are pertinent reasons for believing that the published statistics of rice production in Malaya are underestimated. Not only are the estimated yields of padi subject to some doubt, but the conversion figure of 63 per cent. padi to rice is almost certainly some five per cent. less than that actually obtained by the millers. It is likely that Malaya is, in fact, growing rather more than half her requirements of rice. This gives no grounds for complacency, and increased local production is still the policy of the Government. Such increases will depend in the near future on technical improvements within the existing padi areas. Schemes to improve drainage and irrigation, propaganda in the use of fertilisers and research to evolve heavier-yielding varieties of padi were carried out with vigour during 1953.

34. The campaign for the use of fertilisers on padi lands during the 1953-54 season met with disappointment in Kelantan and Trengganu. The prolonged dry season unduly delayed planting and discouraged farmers from taking up fertiliser even though subsidised to the extent of \$6 per 100 lb. Indeed, only 710 tons were sold out of an expected demand for 2,000 tons. On the other hand, sales of padi fertiliser in Kedah amounted to nearly 700 tons, which can be considered promising in view of the fact that the fertiliser was unsubsidised and that 1953 was the first year in which its use—other than bat guano—was advocated.

35. The regional programmes for the improvement of padi varieties by selection had not reached the stage where massive distribution of seed could be made in 1953. Extension trials of the first post-war selections were laid down in Malacca, Negri Sembilan and Pahang.

36. Tractor cultivation of firm-bottom padi lands has proved practicable and advantageous where a shortage of labour has delayed the reopening of abandoned padi lands. The Rural and Industrial Development Authority in co-operation with the

Department of Agriculture mechanically cultivated, at a charge of \$7.50 an hour, some 4,000 acres of padi fields. Progress in this respect was greatest in Perak.

37. The cost of rice imports over the past five years has been as follows:

COST OF RATIONED RICE IMPORTS

(Pan-Malayan)

Year		Ton		Value in \$
1949	...	495,029	...	200,036,762
1950	...	435,958	...	175,585,707
1951	...	498,929	...	218,739,700
1952	...	423,008	...	198,885,798
1953	...	494,365	...	271,078,715

(iii) OIL PALM

38. The cultivation of the oil palm is confined to estates. Under Malayan conditions, its extension as a smallholders' crop could only follow well-laid plans for central processing. There has been an increase in the area planted, and this is due both to extensions on existing estates and to new plantings on estates changing from rubber or coconuts to oil palms. There are now oil palms on 62 estates as compared with 52 in January, 1953; 48 estates are in production, two more than a year ago. A policy of replanting is being vigorously followed on certain estates; this is a logical concomitant to the greatly improved planting material now available as a result of research.

39. Much of the new development has been on old rubber and coconut land in the coastal clay areas. Although these lands should, ideally, be planted to padi or other annual food crops, in so far as oil palms are substituted for rubber the change is a step in the right direction.

40. The acreages planted with oil palms and the production of oil and kernels are as follows:

Year		Planted Acreage		Palm Oil (Ton)		Palm Kernels (Ton)
1949	...	88,552	...	50,561	...	10,459
1950	...	94,361	...	53,171	...	11,437
1951	...	98,016	...	48,274	...	11,771
1952	...	100,182	...	45,095	...	11,248
1953	...	106,921	...	49,098	...	12,669

(iv) COCONUT

41. The area under coconuts has remained fairly constant since the war. The estimated area is 500,000 acres, of which three-quarters are in smallholdings. Production figures have also remained fairly constant and there are no predictable developments or factors that are likely to affect noticeably yields or the area planted except, as regards the former, the drainage schemes in western Johore. Coconuts are mainly confined to the coastal clays, soils of good natural fertility, which in general do not respond to applications of fertiliser. Drainage however is important, and under good management and water control, yields up to 1,600 lb.

Pig Improvement. Chinese Black.



Pig Improvement. Middle White $\times$ Chinese Black.



Effect of fertilizer on Padi in Kelantan.



Effect of fertilizer on Padi in Kelantan.



of copra per acre are obtained. There are examples of estates where very high yields are maintained through a system of sub-irrigation. This is possible under conditions of plentiful, free-moving, subterranean water and controlled outlet gates whereby the water table can be altered and controlled according to plan.

PRODUCTION (TON)
(Federation of Malaya)

Year	COPRA			COCONUT OIL		COPRA CAKE
	Estates	Small- holdings				
1949 ..	36,957	85,980	..	63,698	..	43,300
1950 ..	38,612	110,866	..	72,800	..	47,819
1951 ..	39,422	120,620	..	86,397	..	55,661
1952 ..	39,523	114,842	..	81,185	..	51,581
1953 ..	40,130	111,666	..	79,459	..	50,422

NET EXPORTS
(Pan-Malayan)

Year	COPRA			COCONUT OIL	
	Ton	Value \$		Ton	Value \$
1949 ..	24,424*	7,159,041*	..	60,504	54,521,306
1950 ..	4,778	14,902,910	..	56,045	60,747,279
1951 ..	10,878*	6,605,527	..	68,139	87,508,297
1952 ..	27,821*	4,501,280*	..	65,113	53,965,806
1953 ..	9,751*	2,084,752	..	60,779	58,033,294

(v) PINEAPPLE

42. In one respect the pineapple is a crop of unique importance to Malaya. It is the only known crop of economic importance that can be grown satisfactorily on peat. The large scale cultivation of the crop continues to be confined to such soils.

43. There has been an increase in the area planted of about 2,000 acres. The total area under cultivation is now 26,846 acres, distributed as follows:

			Packers		Smallholders
Johore	...	...	10,816	...	6,873
Selangor	...	...	130	...	3,459
Perak	...	...	700	...	1,226
Others	...	...	—	...	3,642

44. A new canning factory was opened in South Perak in July. In addition to the packers' own area, which is in process of development, it is expected that the factory will encourage the development of a smallholders' industry. Extensive areas of peat lands are available in South Perak. In Selangor, further land was made available for a packing company. In Johore, there are proposals to make available 16,500 acres in the Ulu Benut area for pineapples. It is intended to reserve 3,200 acres of this for smallholders.

45. Following the freeing of the United Kingdom market from control by the Ministry of Food, pineapple prices at the cannery increased substantially; medium size fruit from 4.9 to

* Net imports.

7.5 cents per lb. and large fruit from 5.4 to 8.5 cents. There were also increases in the prices paid for substandard and small fruit. The prices were negotiated between the packers and growers as provided by the Pineapple Industry Ordinance.

46. The problem of the replanting of smallholders' over-age plantations has been considered by the Pineapple Joint Industrial Council, and it has been agreed in principle that it would be reasonable for the Cess Fund to provide some financial assistance.

47. The experimental programme financed by the industry is proceeding at the pineapple stations in Johore and Selangor. Results have already shown the benefits to be derived from the use of selected, clean, planting material, the application of potash fertilisers and copper sprays. On these peat soils, adequate drainage is of first importance.

48. The production of fruit from small growers in Johore fell by some 8,000,000 lb. in 1953. The cause of this reduction is held to be the resettlement of many of the cultivators made necessary by the Emergency. On the other hand, estate production increased by 4,000,000 lb. Although the total quantity of fruit entering the canneries was 4,000,000 lb. less, the production of canned products was greater in 1953 than in 1952. This was accounted for by greater efficiency in the canneries and by the new production of canned pineapple juice.

49. The voluntary inspection and grading of canned pineapple products continued during the year.

50. The following table shows the exports of canned pineapple products from Malaya since 1949:

EXPORTS				
Year	Ton			Value \$
1949	...	8,137	...	6,307,169
1950	...	14,671	...	12,203,911
1951	...	16,913	...	16,884,112
1952	...	11,781	...	12,564,131
1953	...	17,368	...	19,002,707

(vi) CACAO

51. The first commercial planting of Amelonado cacao took place on an estate in Trengganu towards the end of 1953. The area planted was limited to 50 acres by the amount of seed then available. In addition, State and Settlement multiplication gardens of this variety were extended.

52. Experimental plots of cacao continued to give valuable information on how to establish the crop. It is already evident that cacao comes into bearing several years earlier than in West Africa, but the risk of damage to the fruits by monkeys, rats and squirrels is considerable.

53. More information on cacao establishment and greater quantities of planting material are required before smallholders can be encouraged to take up cacao cultivation.

(vii) TEA

54. Tea is a crop of comparatively recent introduction and it has not become a crop of first importance. There is ample room in the lowlands for expansion but, although prices have been good since the war, it is clear that there is not sufficient confidence in a continuation of high prices to warrant extension of the industry. Yields are heavy in the lowlands, varying from 800 to 1,600 lb. of made tea per acre.

55. Yields in the highlands are lower, and are given at from 400 to 800 lb. per acre. Highland tea estates are usually on steeply sloping hills, but although erosion does occur it is less severe than might be expected in view of the very slight precautions taken by some estates. Blister Blight disease has been kept under control and has had little effect on yields.

56. Production figures are as follows:

MADE-TEA

Year		Production lb.		Exports lb.		Sold locally lb.
1949*	..	3,233,950	..	1,853,291	..	1,606,282
1950	..	3,317,930	..	1,660,350	..	1,610,782
1951	..	3,684,158	..	1,726,786	..	1,887,018
1952	..	3,785,158	..	1,597,947	..	2,016,210
1953	..	4,187,272	..	2,159,295	..	2,021,156

57. The following table gives, for 1953, statistics of acreage and production for highland and lowland estates:

	No. of Estates		Planted area (Acre)		Area in production (Acre)		Plantable reserve land (Acre)		Production made-tea (lb.)
Highland	34	..	5,402	..	3,780	..	3,779	..	1,765,102
Lowland	12	..	3,547	..	2,573	..	11,141	..	2,422,170

(viii) FOOD CROPS, VEGETABLES AND FRUITS

58. Food crops for human consumption, such as sweet potatoes, tapioca, yams, maize and millets, all of which can be successfully cultivated in Malaya, are of little importance in the diet of the people of Malaya. Sweet potatoes and tapioca are widely cultivated by the Chinese for pig food. Maize is mainly grown for sale at a luxury price, to be eaten on the cob. There is a tapioca industry of some importance in Perak where some 5,000 acres of the tubers are cultivated for sale to tapioca factories for the manufacture of pearl tapioca. There has been some increase in arable crop production in young avenue or hedge-row planted rubber, but not on a large scale; soil conditions on old rubber land are seldom really suitable, and such agriculture is not traditional in Malaya.

59. The adverse effect of the resettlement of the Chinese smallholders on vegetable and food production, mentioned in earlier reports, has largely been overcome by the allocation and agricultural development of land adjoining the new villages. There has been a marked improvement in the supply of produce and prices have fallen appreciably. The Member for Agriculture and Forestry again had a fund at his disposal for supplying aid for

* Figures as supplied by estates.
ably due to a carry forward of stocks.

The excess of tea sold to tea produced is presum-

agricultural development in the new villages. In 1953, \$575,000 were granted for projects which included purchase of livestock, erection of pigsties, drains, fences and clearing of new land.

60. Bananas are extensively cultivated as a catch crop in new rubber, and also, where soil fertility is good, in replanted rubber.

61. The 1953 fruit harvests were below average in most areas. Although Malaya has a very uniform climate the fruit seasons are well defined and the principal fruits, rambutans, durians and mangosteens, are markedly seasonal. There is a substantial trade in imported fresh fruit, particularly oranges, apples and pears.

(ix) MANILA HEMP

62. Satisfactory yields are being obtained on some volcanic soils and on well-drained alluvium clays, but nevertheless there have been no new developments that merit comment.

(x) JUTE

63. The variety Segama has yielded well on muck soils in Selangor. Samples of fibre sent to the Imperial Institute in the United Kingdom received a satisfactory report.

(xi) COFFEE

64. Prices for Liberica coffee have remained high at between £350 to £400 per ton. This variety is known to do well on muck soils and clays and some encouragement has been given to smallholders who have wished to replace rubber on those soils with coffee. In Selangor 258 acres have been planted under the Rubber Replanting Scheme.

(xii) SPICES

65. The area under spices has been estimated at 55,600 acres of which 46,300 acres are areca nuts. The others are chillies (3,768 acres), sireh (2,900 acres) and smaller areas of pepper, ginger, nutmegs, cloves and turmeric. Only areca nuts are of importance as an export crop, of which there is a net export of 11,500 tons valued at \$8,698,000.

(xiii) TOBACCO

66. There has been little change; it remains a crop of only minor importance grown by smallholders for the local market. The area under cultivation was estimated at 2,500 acres.

(xiv) MISCELLANEOUS CROPS

67. Other crops of minor importance are derris, gambier, kapok, ipecacuanha, patchouli, citronella, sugar palm, nipah palm, sago, groundnuts, maize, yams and pulses.

C.—STOCK

(i) CATTLE, BUFFALOES, GOATS AND SHEEP

68. The formation of good pastures in Malaya is achieved only after considerable labour and expense, and they require careful subsequent attention if they are not to revert to scrub. Cattle and buffaloes are important in some Malayan padi areas,

notably Kedah and Kelantan, where they are used as draught animals, but even in such areas they are not of significant economic importance and their grazing lands are ill-kept and inadequate. Indian labourers on estates and Indians in the vicinity of the larger towns are the only real cattle farmers in Malaya. Many coconut estates, and to a lesser extent oil palm estates, allow and encourage grazing under the palms. Where drainage is good, and the soils not too heavy, coconuts, oil palms and cattle should go well together. Unfortunately, there is widespread opinion, and much evidence, which is opposed to this admirable system of farming on the grounds that the soil structure of clay soils is harmed by puddling, and cattle are a great nuisance in damaging the open drains.

69. Sheep are mainly confined to the east coast where the long, dry season suits them better than the wetter conditions elsewhere in Malaya. Goats are increasing in popularity and they are important in some areas where the Javanese keep them mainly as stall-fed stock; grazing or browsing is allowed for short periods each day or in dry weather.

(ii) PIGS

70. It can be reported that there are now no acute shortages of breeding stock such as occurred during the resettlement of Chinese squatters. Some new villages may not be keeping as many pigs as they would wish, but generally stock is now sufficiently plentiful to allow expansion wherever desired and where suitable conditions exist. Although pork prices have fallen they are still high, but this is due not to short supplies but the high prices of feeding stuffs.

(iii) POULTRY

71. Reports from all areas show that poultry stocks are increasing and that there is visual evidence of the growing popularity of imported pure breeds such as Rhode Island Red and White Leghorn. New commercial poultry farms have started in most States and Settlements.

TABLE I
DEPARTMENT OF AGRICULTURE, 1953
Organisation and Establishment by Branches (excluding Clerical and Non-technical Minor Posts)

DIRECTOR						
DEPUTY DIRECTOR						
RESEARCH BRANCH	AGRONOMY BRANCH	FIELD BRANCH	PUBLICATIONS BRANCH	EDUCATION BRANCH	ADMINISTRATION BRANCH	MISCELLANEOUS POSTS
1 Chief Research Officer	1 Senior Agronomist	1 Chief Field Officer	1 Publications Officer	1 Principal, College of Agriculture	1 Administrative Officer	1 Horticultural Officer, Penang
6 Heads of Divisions :		1 Personal Assistant		2 Senior Lecturers	1 Office Assistant	
Senior Botanist		6 Senior Agricultural Officers		1 Registrar and Bursar	1 Financial Assistant	
Senior Chemist		10 Agricultural Officers				
Senior Soils Chemist		1 Agricultural Economist				
Senior Entomologist		7 Senior Officers (<i>Leave Reserves</i>)				
Senior Plant Pathologist						
Canning Officer						
13 Other Senior Officers	13 Other Senior Officers					
5 Senior Officers (<i>Leave Reserve</i>)	4 Senior Officers other than Professional Statistician					
1 Assistant Chemist	1 Assistant Statistician					
17 Agricultural Assistant Service Scheme	15 Agricultural Assistant Service Scheme	100 Agricultural Assistant Service Scheme		9 Agricultural Assistant Service Scheme		1 Horticultural Assistant
30 Agricultural Subordinate Service Scheme	24 Agricultural Subordinate Service Scheme	143 Agricultural Subordinate Service Scheme				
9 Miscellaneous Junior Technical Posts	8 Miscellaneous Junior Technical Posts		3 Miscellaneous Junior Technical Posts	2 Miscellaneous Junior Technical Posts		
82 Posts	66 Posts	269 Posts	4 Posts	15 Posts	3 Posts	2 Posts

SECTION III

THE DEPARTMENT OF AGRICULTURE—
ESTABLISHMENT AND STAFF

A.—ESTABLISHMENT

72. The establishment of the Department is shown in the chart at Table I. The number of posts for senior professional officers remained at 70. There were 21 vacant posts at the close of the year, made up as follows:

Agricultural Officers or Agronomists	...	11
Senior Lecturer		1
Senior Plant Pathologist		1
Senior Soils Chemist		1
Chemists		2
Soils Chemist		1
Botanists		4

B.—SENIOR STAFF CHANGES

(i) BRANCH HEAD POSTS

73. (a) *Head Office (Administration)*.—Mr. R. G. Heath, Deputy Director of Agriculture, relinquished duty on the 11th April, 1953, to proceed on vacation leave, and Mr. J. R. Curry, Chief Field Officer, was appointed to act as Deputy Director of Agriculture, with effect from the 12th April, 1953. Mr. Heath resumed duty on the 14th October, 1953.

74. (b) *Field Branch*.—Mr. J. Cook, Senior Agricultural Officer, was appointed to act as Chief Field Officer for the period 13th April, 1953, to 13th October, 1953, when Mr. J. R. Curry officiated as Deputy Director of Agriculture.

75. (c) *Research Branch*.—Mr. L. N. H. Larter, Senior Botanist, continued to act as Chief Research Officer until the 3rd July, 1953, when Mr. R. B. Jagoe assumed duty in the post on return from leave.

76. (d) *Agronomy*.—Mr. E. F. Allen, Senior Agronomist, was on leave from the 19th April, 1953, to the 12th November, 1953. During his absence Mr. R. Henderson, M.C., acted as Senior Agronomist.

77. (e) *Agricultural Education Branch*.—Mr. O. M. Lee, Principal, College of Agriculture, Malaya, relinquished duty on the 14th June, 1953, to proceed on vacation leave. Mr. H. M. James, M.C., Agricultural Officer, acted as Principal, College of Agriculture, from the 15th June, 1953, to the 17th December, 1953, when he relinquished duty on transfer to Pahang as Acting State Agricultural Officer.

(ii) RECRUITMENT

78. The following officers were recruited during the year:

- (1) Mr. D. S. Boyce, B.Sc. (Agr.) (McGill), M.Sc. (*Dunelm*), was appointed Agricultural Engineer, Malayan Agricultural Service, with effect from the 14th July, 1953.
- (2) Mr. G. W. Arnott, B.Sc. (Hons.), D.T.A. (Trin.), was appointed Chemist (Soils), Malayan Agricultural Service, with effect from the 23rd July, 1953.

- (3) Mr. W. P. Panton, B.Sc. (Hons.), D.T.A. (Trin.), was appointed Chemist (Soils), Malayan Agricultural Service, with effect from the 23rd July, 1953.
- (4) Mr. I. J. Wyatt, B.Sc. (Hons.), D.T.A. (Trin.), was appointed Entomologist, Malayan Agricultural Service, with effect from the 23rd July, 1953.
- (5) Mr. B. C. Balbernie, B.Sc. (Agr.), D.T.A. (Trin.), was appointed Agricultural Officer, Malayan Agricultural Service, with effect from the 23rd July, 1953.
- (6) Mr. L. A. Vivian, B.Sc., Dip. Agr. (Camb.), D.T.A. (Trin.), was appointed Agricultural Officer, Malayan Agricultural Service, with effect from the 23rd July, 1953.
- (7) Mr. C. Whitehead, B.Sc. (Hort.), D.T.A. (Trin.), was appointed Agricultural Officer, Malayan Agricultural Service, with effect from the 23rd July, 1953.
- (8) Dr. G. Youatt, B.Sc. (Hons.), Ph.D., was appointed Chemist, Malayan Agricultural Service, with effect from the 5th October, 1953.
- (9) Mr. T. B. Wilson, B.A., Dip. Agric. Econ. (*Oxon*), D.T.A. (Trin.), was appointed Agricultural Economist, Malayan Agricultural Service, with effect from the 12th October, 1953.
- (10) Che Mohamad bin Jamil, B.Sc., D.I.C.T.A., Pupil Agricultural Officer, was appointed Agricultural Officer, Malayan Agricultural Service, with effect from the 25th September, 1953.
- (11) Che Omar bin Buyong, B. Agric., was appointed Pupil Agricultural Officer, with effect from the 12th August, 1953.
- (12) Mr. Chew Hong Jung, B.Sc., B. Agric., was appointed Pupil Botanist, with effect from the 7th September, 1953.

(iii) TRANSFER

79. Mr. R. G. H. Wilshaw, Chief Research Officer, was transferred to the post of Chief Registration Officer, Federation of Malaya, with effect from the 14th October, 1952.

(iv) RESIGNATION

80. Mr. E. W. Bewlay, Agricultural Development Officer, resigned from Government Service, with effect from the 24th September, 1953.

(v) TECHNICAL ASSISTANCE, COLOMBO PLAN

81. In late 1952, a request was made to the Council for Technical Co-operation in South and South-East Asia for the services of eight technical officers on two/three-year contracts. In 1953, the Government of Canada agreed to the release of the following technical officers for service in Malaya:

- (1) Dr. W. J. Cherewick, B.S.A., M.S., Ph.D., Plant Pathologist, arrived in Malaya in July, 1953.
- (2) Dr. W. F. Grant, M.A., Ph.D., Botanist, arrived in Malaya in August, 1953.

SECTION IV

WORK OF THE DEPARTMENT OF AGRICULTURE

A.—RESEARCH AND INVESTIGATION

1.—PADI (RICE)

(i) BREEDING AND SELECTION

82. The programme in progress last year has been continued and new experiments laid down to replace those which have been successfully completed. There were few failures during the 1952-53 season, and few instances of empty ears due to unfavourable climatic conditions at flowering time.

83. (a) *Variety Trials*.—The second post-war series of variety trials ended in 1953, in most cases successfully. Results have been analysed statistically and are to be published later. These experiments have generally confirmed the results of the 1947-50 series and also the choice of varieties for selection in specific areas.

84. Completed trials have been replaced either by intra-varietal trials of new selections [Mayang Sa-Batil selections in Perak (Krian) and Penang and Province Wellesley, Radin Ebos selections in Perlis], or inter-variety trials using inter-State varietal redistribution.

85. Variety trials and observation trials using short-term padis (120 to 150 days) are in progress in most States and Settlements.

86. (b) *Variety Survey*.—Existing variety collections have been maintained and additions made. A new collection of North Kedah and Perlis varieties has been established at Telok Chengai Padi Experiment Station, Kedah.

87. The present numbers of varieties in each collection are:

Telok Chengai, Kedah..	Medium-term North Kedah and Perlis varieties ..	211
Pulau Gadong, Malacca	Medium-term west coast varieties	450
Kota Bharu, Kelantan..	Medium-term east coast varieties	302
Titi Serong, Perak	Long-term west coast varieties	147
Jelawat, Kelantan	Long-term east coast varieties	50
Total ..		1,160

About 850 different, named varieties are represented in these collections.

88. (c) *Variety Selection*.—Selection work in progress may be summarised as follows:

Variety	State or Settlement	No. of Selections (ear-rows) 1953-54 Season
Nachin	Malacca	42
Siam	"	40
Serendah Kuning	Nagri Sembilan	50
Serendah Puteh	"	Foundation Stock
Radin Ebos	Kedah	50
Mayang Sa-Batil	Penang and Province Wellesley, and North Krian, Perak	40
Kontor	Province Wellesley	1,000
Seraup	North Krian, Perak	45
Seri Raja	South Krian and Central Perak	1,000
Machang	North Krian, Perak	Foundation Stock
Acheh Puteh	Tanjong Karang, Selangor ..	138
Anak Naga	Kelantan	267
Mayang Sa-Gumpal	"	1,000

Growth of selection plots was good throughout the year but the Acheh Puteh ear-rows in Selangor were somewhat affected by pests, mostly stem borers. Field trials of Serendah Kuning and Nachin selections in Negri Sembilan and Malacca have given satisfactory results in the first season.

89. (d) *Extension Trials*.—Results of selection field trials of Seri Raja in South Krian, Perak, and Reyong 6 and Serendah Kuning in Malacca have been analysed and published in the October, 1953, issue of the *Malayan Agricultural Journal*.

90. New trials laid down in 1953 are as follows:

Seri Raja in S. Krian and Central and South Perak.

Serendah Sungei Dua 25 in Kedah.

Radin China 17 in West Pahang.

Serendah Kuning 3, 11 and 23 in Negri Sembilan.

Mayang Sa-Batil 8, Seri Raja and Pahit in the riverine districts of South Perak.

91. (e) *Natural Cross Pollination*.—Pedigree stocks have been replanted at Pulau Gadong, Malacca, with a view to recommencing experimentation in the 1954-55 season.

92. (f) *Hybridization—Indica × Japonica Hybrids*.—A total of 248 final selections was made from the four plots of crosses HC. 58 (Serendah Kuning × Asahi), HC. 59 (Nachin 57 × Asahi), HC. 60 (Nachin 57 × Riku 132) and HC. 61 (Norin 1 × Nachin 57). These were planted in ear-rows at Pulau Gadong, Malacca, and Telok Chengai, Kedah.

93. Mass-selected material for plant habit, maturation period and grain characters has also been planted at the same stations for further reselection.

94. Seed of a further 34 crosses was received this year and the 34 have been planted at Pulau Gadong and 24 at Telok Chengai. Insufficient seed did not permit all crosses to be duplicated at the latter station.

95. The difference in growth of these hybrids at the two stations has been very marked. In Kedah, excellent growth has resulted, but in Malacca, growth is slow and poor.

96. *Hybrids of Local Varieties*.—These are again duplicated in Malacca and Kedah and consist of:

28 F_2 selection plots.

46 F_2 micro-plots of doubtful crosses. (It was not possible to ascertain whether the F_1 plants were crosses because of similarity of parental material).

768 F_3 ear-rows.

9 F_3 selection plots.

These local hybrids have grown equally well at Pulau Gadong and Telok Chengai and visually show promising material.

97. (g) *Time of Sowing Experiments*.—The experiments at Endau Padi Test Station, Johore, and Temerloh, Pahang, have given no results due to damage by pests and to unfavourable climatic conditions.

98. An experiment at Kota Bharu Padi Experiment Station, Kelantan, has indicated that a longer maturation period is not positively correlated with greater yield. This experiment will be laid down elsewhere on a larger scale.

99. (h) *Quality Tests*.—Laboratory experiments on milling have been curtailed until the arrival of new equipment, but tests of cooking characteristics of all varieties in the variety collections and of new selected strains of rice have been started.

(ii) STUDIES OF NUTRIENT REQUIREMENTS

100. An investigation has been initiated to study the nutrient requirements of the padi plant in detail by chemical analyses of samples of plants at successively different stages of growth. This is at present confined to plants of Siam 29 at one experiment station, but will be extended over a wider field as early as possible.

101. The investigation to determine the uptake of major nutrients by the padi plant in connection with fertiliser trials was continued throughout the year. A total of 100 samples from manurial experiments in Kelantan, Malacca, Province Wellesley and North Perak was analysed for nitrogen, ash, phosphates, potash, calcium and magnesium. To sum up the results briefly; nitrogen gave an increased uptake in the plants in Kelantan over those receiving no fertiliser; there was an increased uptake of phosphates, calcium and magnesium in Malacca; at Bukit Merah, Province Wellesley, uptake of phosphates and calcium was increased; and in North Perak, the various treatments decreased the ash.

102. *Padi Growing in Sand Culture*.—The purpose of this investigation was to discover and characterise nitrogen, phosphorus and potassium deficiency symptoms in padi. A quantity of river sand was obtained and separated into fractions, those from 0.5 mm. to 1.00 mm. being used for the experiment. The sand was thoroughly washed with hydrochloric and oxalic acids and placed in flower pots which had been coated with bitumen; 750 gm. of sand per pot were used. The hole in the bottom of the pots was left unblocked and the pot placed in a shallow dish, also coated with bitumen, large enough to hold all the liquid which would drain out of the sand when the latter was flooded. At first the solutions were changed every day. The pH was kept at approximately 5.0. Before the seeds were planted each plot was flooded with the solution which would eventually be used for that particular pot. The treatments, in a factorial design, comprised three levels of N, P and K in all combinations. There were two replications, giving 54 pots in all. Plants grown without phosphate, and also those grown without nitrogen, were stunted and growth was poor with no setting of grain. The nitrogen-deficient plants were very pale green, while the leaves of the phosphorus-deficient plants had a pinkish tinge with withering of the tips. By contrast, the plants without potassium showed no signs of deficiency and grew well right up to maturity and produced grain. This was surprising as it is difficult to see how the plants could obtain sufficient potassium from the sand, since extraction of the prepared sand with boiling hydrochloric acid did not give any potash.

103. "*Penyakit Merah*".—Studies of the complex of conditions causing poor growth known as "*penyakit merah*" were begun

during the year. Plants were grown in complete nutrient solution and in solutions deficient in nitrogen, potash or phosphate. In this trial, lack of phosphate caused stunting, while the leaves developed dark, red spots and died back prematurely. Lack of nitrogen also caused severe stunting with yellowing of the leaves and more pronounced die-back of the leaves. Lack of potash did not cause such striking symptoms but the number of leaves was reduced. As "penyakit merah" was much in evidence in many padi-growing areas towards the end of the year, the opportunity was taken to lay down test plots to discover whether the condition could be cured by the application of major or minor elements. These tests are still in progress.

104. Specimens of padi seedlings from a small area in Selangor showed extreme chlorosis and stunting. The worst-affected seedlings died back at an early age. Pot tests on seedlings grown in soil from the affected area indicated that iron deficiency was at least partially responsible for the symptoms.

105. An investigation was also commenced during the last quarter of the year to compare the composition of healthy plants with those suffering from "penyakit merah" to discover whether this is a minor element deficiency.

(iii) INSECT PESTS

106. *Stem Borers*.—A pot experiment in randomized block arrangement has been started to investigate the control of padi stem borers, using EPN 300 and Dieldrin. A replicated laboratory experiment has shown that an application of $\frac{1}{2}$ lb. per acre EPN 300 (25 per cent. actual) would probably not harm fish, providing the water was at least 6 inches deep.

107. Since the liberation of *Paratheresia claripalpis* v.d. Wulp (a sugarcane borer parasite from Trinidad) in Province Wellesley during 1952, no recoveries have been recorded despite an extensive search, the capture of numerous flies in the area, and the collection of large numbers of bored stems which were kept until insects emerged from them.

108. A suggestion by the Commonwealth Institute of Biological Control, that a search should be made for borer parasites in South Asia, is being considered.

(iv) DISEASES

109. A survey of most of the major padi-growing areas was completed in the latter part of the year with a view to assessing the relative importance of the different leaf-spotting fungi, particularly as regards seedlings. During the survey, over 300 nurseries and several hundred fields in various stages of growth were examined. Approximately 400 cultures were isolated from diseased specimens collected throughout the country; more than half of these cultures have so far been passed through the host (padi seedlings) in order to screen out pathogenic organisms from non-pathogens.

110. It was found that over 90 per cent. of the nurseries examined were affected by leaf spots, infection varying from a trace to very heavy. The most prevalent organism was *Helminthosporium oryzae*.

2.—OIL PALM

(i) BREEDING AND SELECTION

111. (a) *Dumpy Palm*.—In 1953, the dumpy palms, with their large girth and small annual height increment, yielded 265 lb. of fruit bunches per palm at the Federal Experiment Station, Serdang, Selangor (0.97 ton oil per acre at an assumed extraction rate of 15 per cent.). The “dumpy” palms continue to be the highest yielders on the Station.

112. In February, 1953, a further 18-acre progeny trial was successfully planted on an estate in Johore. Throughout the year various estates were planting, in the field, observation blocks of 10 to 100 acres. These blocks contain dumpy palm progenies of known origin in compact plots. It is estimated that there were about 500 acres of dumpy oil palms in the field at the end of 1953. During the year, over 30,000 legitimate dumpy oil palm seeds and 3,000 18-month old seedlings were despatched from the Federal Experiment Station, Serdang.

113. The progeny trials and observation blocks planted in 1951 and 1952 have suffered minor set-backs for various reasons, but despite these difficulties are making steady progress.

114. (b) *Deli x Pisifera Material*.—The first phase of the programme to investigate the potential value of the *Deli x pisifera* cross reached the field-planting stage. In this first phase, *pisifera* pollen from selected palms in Nigeria and at the Federal Experiment Station, Serdang, was used to pollinate dumpy *Deli* and ordinary *Deli* palms. Trials to compare *Deli x Deli* material with the aforementioned *Deli x pisifera* material were planted at the Federal Experiment Station, Jerangau, Trengganu, in December, 1953. A 20-acre observation block of the *Deli x pisifera* material was planted on an estate in Selangor also in December, 1953.

115. The second phase of the *Deli x pisifera* programme is based on an exchange agreement with the Institut de Recherches pour les Huiles et Oleagineux, Paris, who are supplying material from French West Africa, and the Institut National pour L'Etude Agronomique of the Belgian Congo. Valuable pollen and seeds were exchanged with these organisations in 1953 and further exchanges for 1954 are planned.

(ii) “BRONZING”

116. Investigations into the cause of “bronzing” of oil palms are still in progress but no final conclusions can yet be presented.

117. It is now recognised that the term “bronzing” embraces at least two abnormalities, i.e.:

- (i) “yellowing” ... a general yellowing of the pinnae
- (ii) “orange spotting” well-defined orange spots on the pinnae which, in severe cases, may fuse to form orange-coloured pinnae.

118. “Yellowing” is closely associated with low levels of magnesium in the fronds, and “orange spotting” with low potassium levels. There are indications that field application of calcium as phosphates increases the uptake of calcium and magnesium but depresses uptake of potassium in oil palms on sandstone soil at the Federal Experiment Station, Serdang.

119. With a view to obtaining further information on the translocation of the various nutrients, leaf samples have been collected from fronds 3, 5, 9, 13, 17, 21 and 25 from healthy, "yellowed" and "orange-spotted" palms selected from among the same five families of palms, E97, E152, E207, E217 and E268, at the Federal Experiment Station, Serdang.

120. The analyses of leaf samples from young palms growing on an estate situated in the coastal area of Selangor have continued throughout the year. A statistical study will be carried out as soon as all the chemical results are ready.

(iii) GERMINATION

121. No experiments on germination problems have been conducted. Experience has shown that oil palm seed stored in hessian sacks which are kept moist will eventually germinate in the sack. When seed which has been stored in these sacks for one or two months is sown in sand beds germination is uniform and rapid. Further investigations on these lines are required.

(iv) INSECT PESTS

122. An outbreak of *Setora nitens* Walk. badly damaged palms on about 1,000 acres of an estate in Perak. Several such attacks by these nettle grubs have been reported from this area since 1949 and their occurrence is probably due to sporadic control measures, the original outbreak not being cleared up and the attack in reality being continuous and not several separate outbreaks.

123. Attacks of *Oryctes rhinoceros* (L.) in Perak, Johore and Selangor were due to the breeding of larvae in decaying rubber and palm trunks, and in vegetable refuse. The need for greater control of this serious insect pest has been emphasised, and the introduction of parasites for biological control is being considered.

3.—COCONUT

(i) SELECTION AND BREEDING

124. Although it was agreed that a coconut breeding programme should be started at an early date, no action was possible during the year.

(ii) INSECT PESTS

125. An attack on a few palms near Nibong Tebal, Province Wellesley, in October, by *Parasa lepida* Cram. was effectively controlled by the natural increase of several hymenopterous parasites. Use of insecticides against this caterpillar was discouraged for this reason.

126. A highly parasitised outbreak of *Artona catoxantha* Hamps. in Malacca, first reported in May on 80 acres, spread within a month to 480 acres, by which time parasitism had inexplicably dwindled. A further outbreak was reported in October from a smaller area a mile to the west. This was also highly parasitised, and no reports have been received since from either area.

4.—PINEAPPLE

(i) SELECTION AND BREEDING

127. The clonal and mass selection plots at Jalan Kebun, Selangor, have shown excellent growth throughout the year and are now fruiting.

128. Twenty-five Smooth Cayenne plants have been planted in the observation plot at Jalan Kebun on release from quarantine.

(ii) INSECT PESTS

129. *Dysmicoccus brevipes* (Ckll.) should correctly be used as the name for the pineapple mealy-bug, and not *Pseudococcus brevipes* (Ckll.).

130. Mealy-bug wilt is present on Singapore Spanish pineapple plants at the Federal Experiment Station, Jalan Kebun, Selangor, Control experiments are in progress.

131. In an experiment to test the susceptibility of the Sarawak variety of pineapple to mealy-bug wilt, six pot plants were inoculated with 20 mealy-bugs each and free access of ants was allowed. Mealy-bugs were obtained from wilted Singapore Spanish pines in the field and in pots. Six control plants were kept free from mealy-bugs and isolated from ants.

132. The mealy-bugs multiplied and were attended by ants, and a green spotting of the leaves appeared, apparently associated with some strains of mealy-bugs but not with wilt. Wilt symptoms appeared on two inoculated plants after 69 and 88 days and one of these two plants produced a weak fruit. The control plants remained healthy and three produced fruit.

(iii) FRUIT GROWTH STUDIES

133. Decrowning of young pineapple fruits has been a usual practice by Chinese growers of the Singapore Spanish canning variety. However, since cultivation of pineapples has been developed on deep peat lands instead of clay soils, the incidence of broken core has increased, especially with decrowned fruits.

134. Various field observations and preliminary trials have been made, on the Federal Experiment Station, Pontian, Johore, and on South Malaya and Jendarata Estates, and seem to indicate that broken core in pineapple is closely associated with interruption of a delicate balance in growth of fruit. For example, the removal of the crown appears to increase the incidence of broken core, especially in fruit developed on younger plants. Similarly, plants grown in soil with insufficient or poorly balanced fertiliser seem to produce fruit with greater incidence of broken core.

135. A further experiment to determine (a) the effect of decrowning against not decrowning, (b) the effect of time of decrowning, and (c) the effect of high and low level of fertility of the soil, is now being established at the Federal Experiment Station, Jalan Kebun, Selangor.

5.—CACAO

(i) SELECTION

136. (a) *Amelonado*.—The 2-acre Amelonado seed garden planted in March, 1950 (as 4-month old seedlings) has yielded

3.5 pods per tree during 1953. The pods contained about 40 beans weighing 115 gm. In comparison with most Trinitario populations, Amelonado is remarkably uniform in yield and pod characters. Fermentation trials with Amelonado have given a recovery of 37 per cent. (dry cacao from wet) and a satisfactory sample of beans.

137. The following Amelonado planting material was distributed from the Federal Experiment Station, Serdang, during 1953:

Type of Material	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total
Pods	397 ..	1,659 ..	444 ..	574 ..	3,074
Seedlings ..	192 ..	100 ..	300 ..	260 ..	852
Cuttings ..	996 ..	50 ..	350 ..	40 ..	1,436
Budwood (yard)	80 ..	56 ..	55 ..	30 ..	221

138. (b) *Trinitario (Pre-1939 Serdang-Cheras Material)*.—Material of this origin has now been shown to be of little value and selections thereof are not being further used in breeding experiments. Tree No. S. 15, however, although very difficult to propagate vegetatively and self-incompatible, has given very interesting cross-pollinated progenies, which are being kept under observation.

139. (c) *Imported Trinitario*.—Five East Indies Trinitario progenies are being compared with Amelonado in a Latin Square trial (FESS. 115) planted in September, 1950. All five East Indies progenies produced more pods than Amelonado but in four of the progenies the pods contained less wet cacao and fewer beans. It is too soon to draw definite conclusions, but it is possible that the progeny of an East Indies selection, T.IN.A., will prove superior to Amelonado. There are so far remarkably few outstanding trees in the East Indies Trinitario populations, but one other tree, No. 173 of T.IN.B., has produced eight pods containing, on the average, 38 beans weighing 180 gm.

140. The Trinitario material (some 800 seedlings) received from West Africa and planted in May, 1951, yielded only 10 pods in 1953. All the pods were from progeny T.9 and contained on the average 41 beans weighing 119 gm. Unfortunately squirrels and *musang* took many pods from this field. Seedlings of T.9 are now carrying a small crop of pods but the other progenies are barely flowering.

141. Other importations, from New Guinea and of I.C.S. clones, are also not yet in bearing.

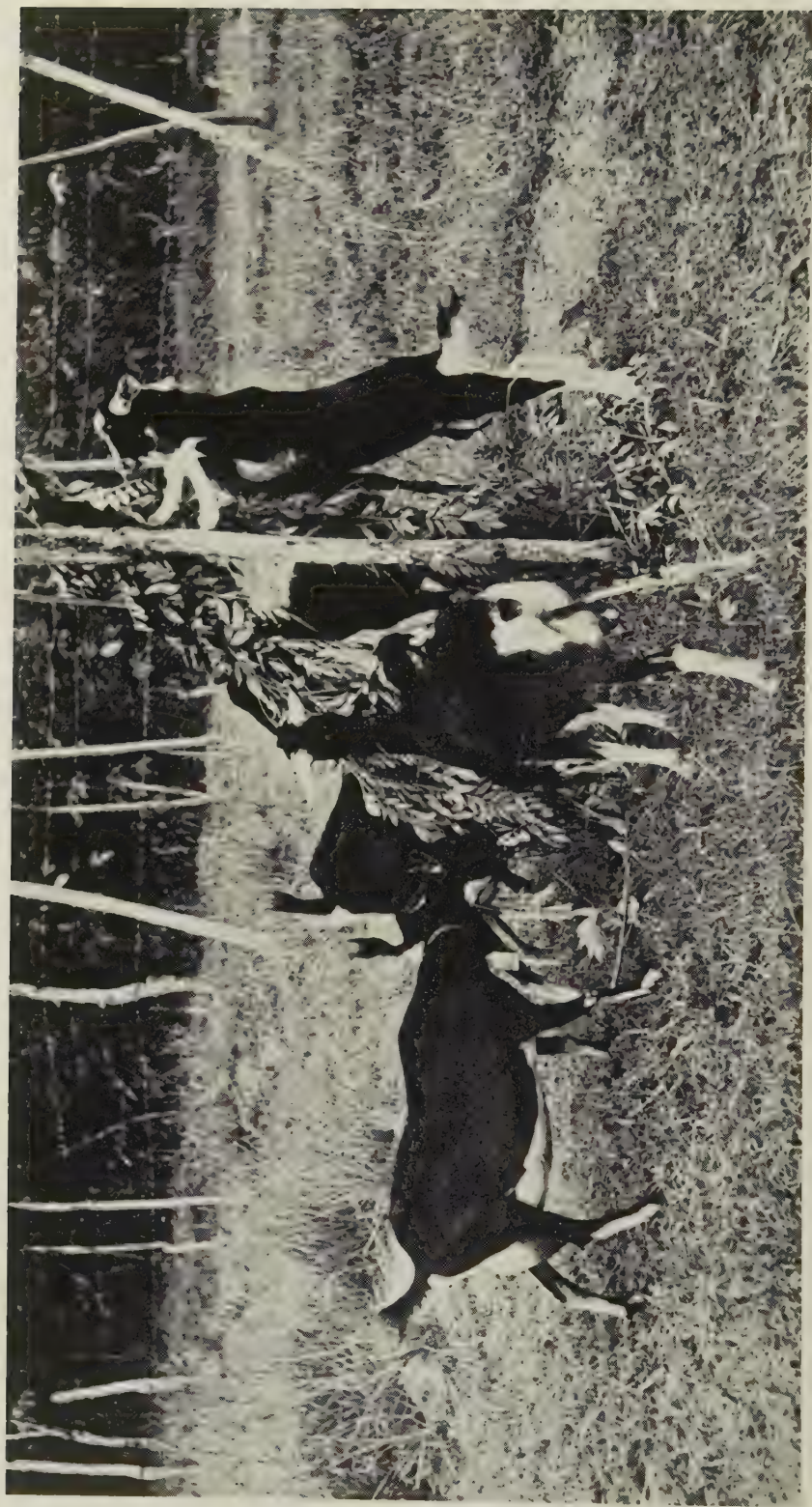
142. (d) *Upper Amazon*.—Open-pollinated Upper Amazon seed was received from the Gold Coast in December, 1951. The seedlings, which were planted in the field in October, 1952, were flowering at the end of 1953 and even carrying a few cherelles. This appears to be the most vigorous of all the varieties under test at the Federal Experiment Station, Serdang.

(ii) VEGETATIVE PROPAGATION

143. The "continuous spray" propagator has only been used for a few months during the year. On the average, 60 per cent. of all cuttings collected were successfully rooted and hardened.



Federal Experiment Station, Jalan Keluan, Selangor, Pineapple experiments, planted 1952.



Goat Improvement British Alpine & Local Breed

(iii) INSECT PESTS

144. After routine dusting of cacao at Cheras Agricultural Station, Selangor, had been discontinued, damage by *Helopeltis theobromae* Miller was not observed for 20 weeks. Six weeks was previously found to be the minimum safe interval between dustings. Control by spraying or dusting with BHC or DDT is advised.

145. Tests, still in progress, against *Apogonia* indicate that a 0.054 per cent. dieldrin spray is showing promise compared with 0.4 per cent. lead arsenate.

146. Cacao beans have been damaged by caterpillars of *Ephesia cautella* walk and the beetles *Carpophilus dimidiatus* F. and *Catorama herbarium* Gorh.

(iv) DISEASES

147. (a) *Stem Diseases*.—The fungus *Botryodiplodia theobromae* frequently occurred on the dead and dying parts of plants suffering from die-back. The failure of inoculations of cultures of this fungus on to healthy cacao stems to cause infection strengthens the view that *Botryodiplodia* is not a vigorous parasite and is not able to attack plants which are growing sturdily.

148. A species of *Fusarium* isolated from a brown stem rot of a young cacao plant was similarly unable to invade healthy tissues.

149. (b) *Root Disease*.—*Fomes noxius* (brown root disease) was recorded for the first time on cacao in Malaya.

150. (c) *Pod Diseases*.—Numerous specimens of rotted pods were examined during the year and tests carried out to discover whether any of the fungi associated with the rots were pathogenic. *Botryodiplodia theobromae*, *Fusarium* sp. and two species of *Colletotrichum* were used in these tests; in no case did infection occur. *Phytophthora palmivora* (black pod disease) has not yet been recorded from any diseased pods in Malaya.

6.—TEA

(i) SELECTION

151. The proposed clonal trials have been held up whilst a satisfactory technique for rooting tea cuttings was evolved. Good results, on a small scale, have now been obtained using a rooting medium of a sand-peat mixture over coarse road metal. If further trials of this technique prove satisfactory, it is hoped to proceed with the proposed clonal trials in 1954.

(ii) FERMENTATION AND COPPER STATUS

152. The experiment to increase the copper content of the tea leaf by spraying the area around the bushes with a weak copper sulphate solution has been continued.

153. It is known that one of the factors which enhances the quality of the made tea is the presence of a copper-protein type enzyme. Samples of tea manufactured on a semi-commercial scale with leaves from these bushes have been sent to tea merchants in London for evaluation.

(iii) INSECT PESTS

154. Two species of termite, *Microtermes pallidus* (Hav.) and *Odontotermes oblongatus* (Holmg.), were found in a tea estate in Selangor. The former is known on occasions to cause considerable damage to tea but the normal habits of the latter have not yet been studied in Malaya.

(iv) DISEASES

155. (a) *Blister Blight* (*Exobasidium vexans*).—This disease continued to do damage at Cameron Highlands, although attacks were not particularly heavy during the year. Towards the end of the year, infection increased but spells of sunshine and dry weather helped to keep the disease in check.

156. Although it has now been clearly demonstrated that good control of the disease is possible by spraying with fungicides, investigations are continuing into means of improving and of reducing the cost of control measures.

157. An experiment to investigate the effect of blister blight on yield is continuing on an estate at Cameron Highlands. During the first ten months of plucking, an increase in yield of 11.6 per cent. has been obtained by spraying with a copper fungicide during recovery from pruning.

158. Other experiments in progress at the Federal Experiment Station, Cameron Highlands, are designed to investigate the effect of blister blight on seedling growth and the effect of different heights of pruning on the severity of blister blight damage.

159. (b) *Root Diseases*.—An experiment on control of red root disease (*Ganoderma pseudoferreum*) was still in progress but was slow to show results.

160. *Red root disease* (*Poria hypolateritia*) and *Ustulina* root disease (*Ustulina zonata*) occurred on a highland estate but only caused a few deaths.

7.—FIBRES

(A) *Ramie*

161. The results of the small ramie clonal trial planted in March, 1951, at the Federal Experiment Station, Serdang, have been analysed. There are significant differences between the clones in yield of green stems and extraction rates. A crop was harvested every two months and from the first nine crops Clone A gave an estimated 852 lb. per acre of decorticated dry fibre per crop (5,112 lb. per acre per year). The costs of harvesting and preparing a good sample of dry fibre are, however, high and it is not clear if the production of ramie fibre would be a commercial proposition.

162. At the end of 1953, after 15 crops, several plots in the trial were beginning to die.

163. A small "spacing" trial and a "time of cutting" trial have been planted.

(B) *Manila Hemp*

164. *Marasmius Stem Rot*.—The fungus causing this disease has been identified by the Royal Botanic Gardens, Kew, as *M. subplexifolius*. In an experiment on the control of this disease, spraying with a copper fungicide has not proved effective.

165. Susceptibility to the disease varies widely in different varieties. According to observations made at the Federal Experiment Station, Serdang, the variety Tangongon is highly resistant, Baguisanon is susceptible and Bangulanon is very susceptible.

(C) Jute

166. The fungus (of the *Colletotrichum capsici* group) causing stem canker and damping-off of jute has been shown to be seed-borne. In an experiment on the control of the fungus by seed treatment, Agrosan GN and Fernasan were found to be very effective. Mercuric chloride (0.1 per cent. solution in water) was considerably less satisfactory, although partial control was obtained.

8.—PASTURE AND FODDER CROPS

(A) Pasture

167. The experiment to compare the yield and palatability of the two carpet grasses, *Axonopus compressus* and *A. affinis*, grown with and without shade was continued throughout the year. Shade trees were still young and there was little difference in the yield between the two species or between shaded and unshaded plots.

(B) Fodder

168. (a) *Guinea Grass*.—An experiment to test the effect of applying NPK in various combinations was in progress during the year.

169. The experiment to test the effect of applying fertilisers at varying intervals was continued and the plots receiving the fertilisers at more frequent intervals maintained their higher yields.

170. (b) *Napier Grass*.—An experiment to test the effect of three rates of application of sulphate of ammonia on yield and quality of five strains of Napier grass has been continued. The local variety has given the highest yield and both yield and percentage of protein would appear to be fairly consistent and to vary directly with the rates of application of the fertiliser.

171. (c) *Miscellaneous Fodders and Feeding Stuffs*.—As livestock-keeping continued to gain in popularity during the year, numerous enquiries have been received regarding the composition and nutritive value of various fodders and feeding stuffs and on problems of rationing.

172. Mashers for a poultry feeding trial have been checked and samples of growers' and layers' mash from Negri Sembilan have been analysed.

173. Some of the other miscellaneous feeding stuffs which have been examined were kapok seed cake, pineapple silage, durian seed, beetroot, *Althernanthera* plants and rubber seed kernel.

9.—FOOD CROPS

(A) Soya Bean

174. From the seven bulked progenies resulting from selection on Indonesian varieties, four have been discarded but the remaining three are being maintained.

(B) *Groundnut*

175. Selection work on this crop commenced during the year at the Federal Experiment Station, Serdang. Promising results are being obtained. Altogether 211 selections were planted during November, 1953.

(C) *Sweet Potato*

176. The collection of sweet potato varieties has been maintained and 12 varieties have been selected for trial with a view to providing plants with a high yield of "tops" for pig feeding.

(D) *Vegetables*(i) *TOMATO*

177. In a spraying experiment to test different fungicides, blight (*Phytophthora infestans*) was controlled most satisfactorily by Perenox. Bordeaux mixture and SR406 appeared to be less effective but yields from the three treatments did not differ significantly.

(ii) *CARROT*

178. In monthly plantings at Cameron Highlands to observe the effect of leaf blight (*Alternaria dauci*) on yield at different times of the year, higher yields have in all cases been obtained from sprayed plots. The increase in yield in five crops varied from 15.5 per cent. to 69 per cent., with an average of 41 per cent.

(iii) *FRENCH BEAN*

179. An experiment in which French beans are being planted at monthly intervals at Cameron Highlands to discover at what periods of the year spraying against anthracnose (*Colletotrichum lindemuthianum*) is advisable, has been begun. Increases in yield of up to 102 per cent. in the sprayed plots have been recorded.

(iv) *ONION*

180. *Dizygomyza cepae* Hering, the recently imported onion leaf-miner, has spread widely in the Federation from Singapore where it was first reported. The fly is unknown in India where most planting material originates. Field tests showed that insecticide application increased yields by 25 per cent. Only BHC is considered safe to use because of the short growing period of onions under Malayan conditions.

10.—*FRUITS*(A) *Banana*

181. The variety collection at the Federal Experiment Station, Serdang, has been maintained.

(B) *Rambutan*

182. A third record was made of *Acrocercops cramerella* Snell. attacking rambutan fruits. This is a potential pest of cacao.

11.—*SPICES*(A) *Cloves*

183. A further field trial for the control of the two Cerambycid clove borers, *Niraeus tricolor* Newm. and *Aphrodisium* sp., has been carried out. Dieldrin and Gammalin treatments showed no attack, but full protection was not given by BHC dispersible powder. All control trees were attacked.

(B) *Pepper*

184. The weevil, *Lophobaris piperis* Mshl., has caused serious damage to pepper in Selangor and Singapore. This is the first record of this weevil in Malaya. The female gnaws holes in the nodes for oviposition, and the larvae ring the nodes and bore down the centre of the stem, causing die-back. Spraying may prove an effective control as adults live on the vines for a month before egg-laying. Collection by beating may help. A related species, *L. serratipes* Mshl., has also been recorded for the first time, but does not appear to be common.

185. A mosaic disease of pepper occurred in Singapore and also in Perak. Symptoms were pronounced yellow mottling and curling of the leaves, which were smaller than normal. The symptoms suggest a virus disease.

12.—SOIL INVESTIGATIONS

(i) GELAM SOILS

186. In the past the soils on which the gelam tree (*Melaleuca leucadendron*) grows have had a reputation for being poor padi soils, especially after being opened up for some years. Initial investigations on these soils in the Malacca area showed that they often have a high content of sulphur. Sulphuric acid results when those soils are opened up and drained, and the ensuing high acidity, when not removed by leaching, is a probable cause of the poor padi growth.

187. However, further work in other gelam soils has indicated that the sulphur may not be the only reason for the poor growth, as some soils do not have a high content. A further complication arises from the fact that certain soils on which gelam has grown or is growing, give good crops of padi, e.g., in Kedah. There is no doubt, as the following descriptions will show, that gelam grows on a very wide range of soils, and its presence cannot always be used as indication of poor padi soils.

188. The extension of the work, aimed at finding out the connection between soil type and growth of gelam, has included detailed field examination of certain areas of gelam soils. In addition, laboratory examination of samples from these areas with a view to determining their other characteristics as well as sulphur content has been carried out.

189. At Tanjong Minyak, Malacca, where a proposal for a drainage scheme had been put up by the D.I.D. an area of 1,500 acres was surveyed and the soils examined in detail. Part of the area is old gelam land, some has standing gelam and some parts are completely free of gelam. A very wide range of soils was found and it was noted that gelam was not found on deep peat, but that it attained its strongest growth on the silty clays and clays-soils which from a textural point of view are the most suitable for padi.

190. At Batu Rakit, Trengganu, also an area of gelam or former gelam land where an irrigation scheme is in progress, a survey was made. Contrary to what was found in Malacca, gelam was making vigorous growth on peat, 9 feet or more in depth. On the sandy soils of the old raised beaches the gelam showed very poor growth. It would appear that, though gelam can exist in conditions of extreme soil poverty, certain soils become so poor that not even gelam will grow.

191. A brief survey was also undertaken of the Sungei Raya area near Port Dickson, yet another area where a D.I.D. scheme is under consideration. The soils, generally silt and silty clays, are in some places covered with stands of young gelam and in others with virgin gelam. The virgin gelam areas appear to be highly sulphurous. In places, pools of clear water with a strong smell of hydrogen sulphide are found. Plant debris in the bottom of these pools is covered with a yellow green slime.

Laboratory Investigations on Gelam Soils

192. As noted above, more detailed examination of gelam soils has indicated that the amount of sulphur is not the only, though it may be a major factor, in distinguishing these soils. The different forms in which sulphur can occur in the soil is obviously important and methods of determining sulphides and polysulphides have been examined. The rate at which sulphates are formed by oxidation when the soils are exposed to air has also been examined and it has been found that the rate of oxidation increases with depth down the profile, being greatest at about 4 feet. The rate of oxidation is most important when the degree and depth of drainage is being considered. If the soil is drained deeply to allow oxidation, but the sulphuric acid is not leached out, it will rise towards the surface when the area is water-logged again.

193. The possibility of aluminium and manganese toxicity, brought about by the highly acid conditions, is a factor to be considered as regards damage to plants and results indicate that the active, i.e., toxic aluminium, increases with depth. The exchangeable manganese has been found to increase down the profile. The possibility of a deficiency of plant bases being brought about by leaching by the sulphuric acid, which is formed on oxidation of the sulphur compounds, has also been considered; some of the gelam soils have been found to be very low in exchangeable cations, i.e., potassium and calcium.

194. The conclusions to be drawn from these investigations are that gelam soils are not all bad for padi cultivation, but the growth of gelam should be taken as a warning that the soils should be examined thoroughly. Furthermore, even the gelam soils which are inimical for padi are not all high in total sulphur, and the possibility of the secondary effects of high acidity, i.e., aluminium and manganese toxicity and low content of plant nutrients due to acid leaching should be examined.

(ii) BASE EXCHANGE CAPACITY OF MALAYAN SOILS

195. Many of the properties of soils, e.g., their physical conditions, depend on the type of clay. More recently it has been shown that the reaction of the soil to phosphate can be correlated with the degree of base unsaturation of the soil. The clay fraction of a large number of soils was separated by sedimentation and the base exchange capacity of these clays was determined using a semi-micro method. The method involves treatment of the clay with ammonium acetate and, after washing, distilling off the ammonia in a Micro-Kjeldahl apparatus. The method is very quick and gives good agreement between duplicates. Some of the clay fractions from the very heavy, sticky coastal clays of Krian, Perak, have cation exchange capacities of the order of 38 to 47 milli-equivalents per 100 gm. At the other end of the scale, clays from granite soils have values as low as 11 milli-equivalents per 100 gm. The clay from

a white soil from Malacca, which was reported to be very poor, had a value of 6 milli-equivalents per 100 gm., a value very close to that for pure kaolin.

196. At the same time, investigations have also been carried out on the cation exchange capacity of the soils from which the clay fractions were separated. The conventional method, by leaching the soils with a neutral salt, is much too tedious and lengthy to be of use for investigating a large number of samples, and a colorimetric method using cupric acetate was tried out and found to give satisfactory agreement with the conventional method. Furthermore, large numbers of soil samples can be examined in a comparatively short time.

197. Using the recently installed flame photometer, the exchangeable cations will be determined and from this the determination of the degree of base saturation can be calculated. This should give a lot of useful information on the fertility status of Malayan soils.

(iii) SOIL SURVEY

198. Again it can be reported that the arrival of further staff, on this occasion a Geologist trained in soil survey work, has enabled a start to be made on closer investigation of soil classification. The provisional classification of Malayan soils put forward by Owen has been used as a basis and a detailed soil survey of the Federal Experiment Station, Serdang, has been carried out. Eight series were identified and some of these appear to be typical only of Serdang. The greater part of the upland soil was identified as belonging to the Kedah Series, i.e., the well-drained soils derived from quartzite. This is generally a fairly shallow soil but towards the bottom of the slope is found a deep friable brown loam on which the growth of cacao and oil palms is better; this has been tentatively named the Serdang Series. Some of the soils which gave difficulty in classification are the black, rather poorly-drained soils occurring in certain patches on the Station. It has been suggested that this colour is due to the reduced compounds of iron and aluminium, the reducing conditions being brought about by bad drainage. Other soils have been disturbed by mining, and these, together with the areas of laterite soils apparently derived from limestone residues, make the soils of the Station a most complex group.

199. As from the 1st December, the Soil Surveyor was seconded to the Singapore Government for a period of three months to carry out a soil survey of parts of the island for food production.

200. Meanwhile, samples continue to be received from the Trans-Perak Scheme. No surveying took place until towards the end of the year when a firm of consultant engineers undertook further topographical survey of the area, also taking soil samples at the same time. To-date, approximately 50,000 acres have been soil sampled; included in this is approximately 13,000 acres of peat and muck. Some of the peat is shallow but there are considerable areas with depths of peat greater than 9 ft. Based on the amount of clay and silt much of the area so far surveyed can be considered satisfactory padi soil.

201. *Miscellaneous Soil Surveys.*—Some considerable time was taken up in soil surveys for advisory purposes. They included an area for an Agricultural Station at Telok Gadong, Selangor, and also for a Station at Rembau, Negri Sembilan, an area in the

Kota Tinggi area of Johore for a Rural and Industrial Development Authority development scheme, a visit to an area in Singapore at the request of the Singapore Government, and to a number of estates in connection with various problems. Numerous soil samples taken from areas proposed for squatter resettlement were also received.

13.—MISCELLANEOUS PESTS

(i) *PATANGA SUCCINCTA* (L.)

202. *Patanga succincta* (L.), a large grasshopper, has appeared in six recently cleared areas near Raub, Pahang, causing considerable damage to dry padi. There is no authentic record of more than 100 acres of dry padi being damaged in Malaya by this insect. Dusting and spraying with BHC was not altogether successful as the entire area could not be treated due to terrorist activities. Consequently the grasshoppers were driven into other parts of the area. Paris green and bran baits were highly successful, but only on bare ground or sparsely covered ground. Late reporting of outbreaks, however, allowed the insects to spread widely before control measures could be applied.

(ii) TERMITES

203. Advice on prevention and control of termite attack in government buildings has been sought. With the valuable assistance of the Termite Research Centre in Canberra, a memorandum has been prepared on this subject. The Division of Entomology has been co-operating with the Public Works Department in the treatment of buildings against termite attack.

204. Experiments have shown that 500 c.c. of Aldrex 2 (0.04 per cent. actual) will give complete control when poured into a hole bored into the nest. Dieldrex 15 (0.036 per cent. actual) is a little slower in action. Other insecticides tested proved unsatisfactory.

(iii) NEMATODES

205. Interest has been aroused recently in the nematodes of Malaya. *Meloidogyne* sp. is the commonest, causing swellings on the roots of pepper and numerous other plants. It has also been received from Sarawak. This, and two other species, were found on jute. *Radopholus similis* (Cobb.) Thorne has caused serious damage to bananas in one area, but has not been recorded on pepper, its normal host.

B.—AGRONOMIC INVESTIGATIONS

1.—CROPS

(A).—Padi

(i) WET PADI

(a) *Mechanisation*

206. Early in the year, threshing trials were conducted in Kedah, Province Wellesley, Perak and Selangor with the following machines:

- Turner "Economy" thresher, tractor-driven
- Tullos thresher, engine-driven
- Tractor-mounted threshing drum
- "Taki" treadle-operated threshing drum

Of these machines the first proved to be the most efficient but its mobility in padi fields was limited. There were drive difficulties

with the Tullos thresher, which is normally hand-operated, and little progress was made. The tractor-mounted threshing drum, first tested at Bukit Merah, Province Wellesley, showed exceptional promise since it could be taken wherever a tractor could go. The cheap "Taki", a Japanese machine, proved popular in Selangor but met with a less favourable reception in the old-established padi areas of the north-west, where hand threshing is a very efficient operation.

207. Encouraging advances were made in the technique of cultivation of wet padi land, especially in Perak, where Ferguson tractors fitted with Bombardier half-tracks did excellent work on soils which remained soft below the surface. Similarly, in Negri Sembilan, the use of large-diameter steel wheels permitted economic cultivation under very sticky conditions.

208. Promising new implements under test included an ingenious "Roto-Plough" which is, in effect, a mounted harrow-plough with power-driven discs. This was developed in Perak and is still in the prototype stage.

209. During the year the following new padi-harvesting machines became available:

McConnel Jay Corn Windrower

Massey Harris "80" Rice Special combine

"Simplex" rice header

"Complex" rice header

The windrower and the two headers were designed for direct mounting on the back of a medium wheeled-tractor, whereas the combine-harvester is a self-propelled machine on tracks. Both headers are prototype machines developed locally.

210. Ambitious harvesting trials commenced in north Kedah during the second-half of December and are planned to continue for three months. The Massey Harris rice combine proved to be very efficient and costs will be studied with great interest.

211. Two items of ancillary equipment proved of interest during harvesting trials. These were a tractor mounted buck-rake and a stationary, power-operated baler. The first was capable of the efficient collection of padi straw after combine harvesting and this straw was later made into bales of a convenient size for carting to cattle sheds. This combination forges an important link in the integration of wet padi cultivation and mixed farming.

(b) *Fertilisers*

212. Results from the current series of manurial trials continue to be of very great interest. These trials were mostly laid down in 1951 and will be complete in early 1954. Full publication of results will be postponed until then, but certain trends are now clear.

213. From phosphate investigations there are suggestions that nursery application of soluble phosphates may sometimes be worth while; that bat guano is slightly more effective than rock phosphate; that superphosphate is sometimes more effective than either and that different types of rock phosphate do not differ in relative efficiency.

214. Where nitrogen and phosphates are applied together it appears not to matter whether they are combined, as ammonium phosphate, or separate, as sulphate of ammonia and super-phosphate.

215. The type and depth of nitrogen series of experiments has failed to reveal any difference, in extent of response, between placement in the soil or broadcasting on wet mud. However, these experiments have demonstrated conclusively that, where nitrogen gives a response, sulphate of ammonia is usually superior and never inferior to nitrate of soda.

216. Factorial trials in Kedah and Kelantan have suggested that larger dressings than those tested would be economic. At Telok Chengai, Kedah, a nutrient ratio of 60 : 60 : 15 : : (N : P_2O_5 : K_2O), would seem to be about right larger applications of potash being harmful.

217. It is fairly clear that, except on special soil types, greatest responses are obtained from applications of the three chief nutrients (N P K) but that calcium and magnesium together may be required in certain localities in parts of Malacca, Perak and Province Wellesley. Some form of lime appears to be required in addition to N, P and K for best yields on peculiar soil types in Kelantan.

218. It has been shown that N P manuring, with phosphates applied before transplanting and the nitrogen about eight weeks later, can result in economic yield increases over large areas of Kedah and Province Wellesley and that the same is true of the complete mixture in Kelantan.

219. There are strong indications that some varieties of padi differ in their response to manures.

220. There still remain large areas, especially in Krian, Perak, where manuring in the ways tested is usually ineffective. However, there is no reason to suppose that the peculiar problems of these areas will not be solved by special investigation technique.

(ii) DRY PADI

221. Mechanical harvesting by combine-harvester has greatly aided the running of Melor Padi Experiment Station, Kelantan, where most of the dry padi investigations are in progress.

222. Manurial trials confirmed previous findings that fertilisers increased yields and that nitrogen was probably the most effective nutrient in this respect, provided that P and K were present in adequate amounts.

223. A comprehensive factorial trial designed to test various combinations of times of application and quantities of sulphate of ammonia was laid down in the 1953-54 season.

(B).—Oil Palm

224. An intercultivation and cover crop experiment at Serdang was concluded in March. No significant differences between treatments were recorded but the results showed conclusively that non-experimental factors, such as age of palms, war-time neglect and uneven soil, were so depressing yields that results of value could not be obtained from the particular layout.

225. Growth has been slow in a large manurial and replanting experiment at Serdang. The main treatments in this trial consist of the removal of old palms before planting the young palms and their removal one, two and three years afterwards. Height measurements of the young palms prove the superiority of early removal, whereas delayed felling also delays flowering. These measurements also indicate that young palms respond to applications of nitrogen (significant at 0.1 per cent.) and potash (significant at 5 per cent.).

226. The conduct of a co-operative manurial experiment on young palms on a Selangor estate continues to be satisfactory but harvesting has not yet commenced although some of the palms are in bearing.

(C).—Coconut

227. In the absence of a special coconut station, very little agronomic work is in progress. However, a new manurial trial has been designed and laid down on sandy coastal soil in Trengganu and the recording of pre-treatment yields has commenced.

228. A factorial manurial trial laid down at the Federal Experiment Station, Serdang, in 1951, is still receiving uniform treatment designed to achieve even establishment.

229. Long-term planning of agronomic investigations has been carried out on the assumption that funds will permit the opening up of the new Federal Experiment Station, Teluk Bharu, south Perak, in 1955. It has been decided that coconuts will be the chief crop on that station.

(D).—Pineapple

230. Results from co-operative trials on estates in south Johore have been of decreasing value and reliability, although yields and conditions of growth appear to have improved steadily. This reduced reliability was partly a result of communist terrorist activity, and some of the trials were terminated towards the end of the year.

231. The new series of trials on the Federal Experiment Stations at Jalan Kebun, Selangor, and Alor Bukit, Johore, have not given much precise information during 1953 since the plant harvest from most trials is not expected until early 1954. However, the first experiment to be planted at Alor Bukit has shown that a hormone spray nine months after planting induced fruiting in the Singapore Canning variety but not in Sarawak pines. The plant crop from the former variety was harvested at the end of the year and a highly significant difference was recorded between yields from the two spacings. The higher yield from the closer-spaced crop was associated with a significantly smaller fruit size. These important results are summarized in the following table:

Treatment		Spacing (feet)	Plants per acre	Yield of fruit (lb. per acre)	Mean fruit weight (lb.)
S1	..	1×2×4	14,520	21,760	2.308
S2	..	6×2	3,630	9,781	3.208
Standard error	..	—	—	±504.75	±0.052967

The high yield from the closer spacing is notable in view of the low average yield from commercial crops. However, the somewhat small fruit size suggests that the hormone application might well be delayed until 13 or 15 months after planting.

232. Another spacing trial, on an estate in Johore, has given similar results but with the level of yields lower:

Spacing (feet)	Plants (per acre)	Yield of fruit (lb. per acre)	Mean fruit weight (lb.)
3 rows, 3×3×5 ..	990 ..	5,658 ..	2.930
3 rows, 2×2×4 ..	1,968 ..	10,062 ..	2.852
Single rows. 6×2 ..	902 ..	5,630 ..	2.958
2 rows, 2×1×4 ..	3,630 ..	14,603 ..	2.668
Standard error ..	— ..	±672.374 ..	±0.03298

233. An intercultivation and manurial experiment with pineapples through rubber on a bog soil in Selangor has given two crops during the year. Yields are summarized below:

Treatment	N : P ₂ O ₅ : K ₂ O Ratio	FOURTH CROP		FIFTH CROP	
		Yield of Fruit (lb. per acre)	Fruit Weight (lb.)	Yield of Fruit (lb. per acre)	Fruit Weight (lb.)
A. 4 cwt. per acre Sterameal ..	7 : 10 : 5 ..	16,227 ..	2.65 ..	13,367 ..	2.71
B. (A + E) ..	5.4 : 12.7 : 15.6 ..	18,486 ..	3.02 ..	13,055 ..	2.73
C. Magnesium lime- stone, 5 cwt. per acre ..	— ..	14,984 ..	2.85 ..	13,858 ..	2.69
D. (C + E) ..	4.2 : 14.8 : 24 ..	15,209 ..	2.92 ..	14,070 ..	2.84
E. 5 cwt. per acre, N.P.K. mixture ..	4.2 : 14.8 : 24 ..	17,710 ..	3.02 ..	14,970 ..	2.75
F. Control, no fertiliser Standard error ..	— ..	14,870 ..	2.77 ..	15,266 ..	2.65
		±991.73	±0.0992	±774.10	±0.0970

It will be seen that, in the fourth crop, the yield from Treatment B was significantly superior to that from the control plots. Differences in fruit size were non-significant. None of the differences recorded from the fifth crop attained statistical significance. Perhaps the most interesting feature of these records is the very satisfactory mean yield of 30,346 lb. per acre per annum from an interplanted crop.

234. The peat soil of the Federal Experiment Station, Jalan Kebun, Selangor, is well weathered and free from surface timbers. Growth in consequence has been very uniform and a considerable degree of mechanised cultivation has been possible with young crops of experimental pines.

(E).—Cacao

235. At the beginning of the year there were 45 agronomic experiments on estates and Agricultural Stations of which seven were concluded during the year. Four of these trials had demonstrated the conditions under which cacao could be established and there was no reason for their continuation since the trees were all of the Trinitario variety, with inferior bean characteristics. Two other trials were planted with Criollo cacao, one a manurial experiment under jungle shade, the other a progeny trial interplanted with old oil palms. These two trials were concluded because of lack of vigour of the cacao. The seventh was an establishment trial and was abandoned before planting out any cacao because the secondary shades had shown such poor growth.

236. Two new experiments, both concerned with early establishment technique, were laid down at the Federal Experiment Station, Jerangau, Trengganu, during the year.

237. In a Trinitario manurial trial on Rengam Series soil at Jerangau Estate, Trengganu, girth measurements taken in November once again demonstrated that young cacao, when grown under adequate jungle shade, requires only phosphate on this

particular soil type. This important result will make possible a large reduction in the cost of manuring on this estate during the first two years after planting out.

238. Lack of vigour of basket seedlings of Amelonado cacao has been found to be associated with the use of fresh jungle topsoil. The same physiological wilt was not present when soil from exposed areas was used in baskets or when a proportion of coarse sand was used in the compost. Investigations on this problem are still in progress.

239. Observations on small isolated cacao experiments have shown clearly that the control of rodent pests is essential if a reasonable crop is to be harvested. Efficient control of squirrels has been achieved by shooting in the main cacao area at Serdang but the protection of isolated areas is much more difficult and more expensive.

240. It has also been demonstrated at Jerangau, Trengganu, that protection from rodent damage is required for successful establishment of seed-at-stake plantings. In this instance rats are the chief pests whereas squirrels do most of the damage to pods.

241. In budwood nurseries at the Federal Experiment Station, Serdang, shade trees of *Erythrina subumbrans* suffered temporary defoliation from a combined attack of shoot borers and Jassids but subsequent recovery was rapid. This particular shade tree provides excellent conditions for young cacao but it would clearly be undesirable to rely on a pure stand.

242. The most promising new shade under test is the hybrid *Leucaena glabrata* x *glauca* but planting material of this is still being bulked and extensive trials will not be possible before 1955.

243. Growth in a small block of Upper Amazon cacao at Serdang has been extremely vigorous.

(F).—Tea

244. A pruning and disease control experiment was laid down at the Federal Experiment Station, Cameron Highlands, and the recording of pre-treatment yields commenced in April. The first pruning treatments were carried out before the end of the year.

245. A total of 726 plants representing 38 clones has been established in a clonal collection of lowland tea at the Federal Experiment Station, Serdang. Basket plants of many other clones have been raised and these will be planted out in early 1954.

246. A large tea-rooting trial at Serdang was completed during the year. This consisted of three replications, each of 20 cuttings of 200 clones, and standard open-bed technique with heavy fern shade was adopted. A field count, completed in February, indicated that the overall take was 32 per cent. but the final count of established cuttings in baskets gave the very disappointing average of only 7.9 per cent. with a range of from nil to 25 per cent.

247. Subsequently, a rooting technique trial was carried out under natural high shade of *Erythrina subumbrans* in which five different media, two degrees of ferning and two watering intensities were tested. The result of this trial showed that the medium

used was more important than frequency of watering and that the combined *Erythrina* and fern shade provided favourable conditions for rooting. The best two media consisted of 50 per cent. coarse river sand and 50 per cent. of either weathered peat or jungle soil with added Krilium. Final rooting percentages with these media averaged 62.5 and 71.1 per cent. respectively.

248. At the Federal Experiment Station, Cameron Highlands, the two plants *Eupatorium riparium* and *Dolichos hosei* have proved satisfactory for the control of erosion. Both plants have a creeping habit and are normally propagated from cuttings. The second is a legume. The well known *Indigofera endecaphylla* has been found to be less suitable because of its greater tendency to climb over tea bushes.

249. In an interplanting trial with old coconuts on a Selangor estate, tea proved to be difficult to establish on coastal clay soil but subsequent growth was satisfactory.

(G).—*Coffee*

250. In a co-operative trial on an estate in Selangor, Liberian coffee interplanted with old, tall coconuts is growing well but has not yet come into bearing. Spacings under test are one row, 6 ft. apart, and two rows spaced 10×8 ft. The coconuts are planted 30×30 ft. apart.

251. In two manurial experiments on deep peat soil at the Federal Experiment Station, Jalan Kebun, Selangor, Liberian coffee was transplanted in May and June, 1953, and subsequent growth has been satisfactory. Treatments under test include peat burning, applications of magnesium limestone, nitrogen, phosphoric acid and potash, and nutrient sprays of manganese, copper, boron and zinc.

252. At the Federal Experiment Station, Serdang, in a shade and variety trial which was planted in January, 1948, light and heavy shade provided by the leguminous tree *Adenanthera pavonina* is compared with absence of shade for Liberian and Uganda coffee. Yields of dried beans for the two years 1952 and 1953 are given below:

Variety	No Shade (lb.)	Light Shade (lb.)	Heavy Shade (lb.)	Mean (lb.)
Liberian	777	488	393	553
		(± 73.325)		(± 42.334)
Uganda	472	308	253	344
Mean	624	398	323	448
		(± 52.113)		

These figures indicate that, under Serdang conditions, any form of shade reduces the yield of Liberian coffee and that heavy shade does the same for Uganda coffee. The spacing adopted, 15×10 ft., is clearly above optimum on this Kedah Series soil, which partly accounts for the low yields. Liberian coffee without shade averages only 388.5 lb. per acre per annum of beans, a yield which compares unfavourably with the cropping capacity of the same variety when grown on coastal muck-soils.

253. Two extra blocks of the shade trial were planted with the *Arabica* $\times$ *Liberica* hybrid coffees Kalimas and Kawisari in November, 1948. Yields from Liberian coffee in these two

replicates were comparable with those already recorded, but the hybrids gave the following very disappointing bean yields per acre:

Hybrid	No Shade (lb.)	Light Shade (lb.)	Heavy Shade (lb.)	Mean (lb.)
Kawisari ..	131	90	145	122
Kalimas ..	71	132	66	90

A large proportion of empty beans or one-seeded berries from these hybrids was found to be responsible for the low yields, and this is reflected in the following low conversion rates:

WEIGHT OF BERRIES TO 1 lb. OF BEANS

Variety	No Shade (lb.)	Light Shade (lb.)	Heavy Shade (lb.)	Mean (lb.)
Liberian ..	11.2	10.3	10.2	10.7
Uganda ..	6.3	6.8	6.4	6.4
Kawisari ..	21.8	22.9	17.3	20.3
Kalimas ..	21.3	16.0	17.8	17.9

Conversion rates are reasonably normal for Liberian and Uganda, the latter being a variety of *Coffea robusta*. However, the hybrid figures are so low that they can be of no commercial value. Both these hybrids are reputed to be resistant to the leaf disease *Hemileia vastatrix* and they might be of use in a breeding programme.

254. A rooting trial with Kalimas hybrid has been carried out at Kuala Lumpur using three different media. This trial yielded from 50 to 75 per cent. established plants. Care was taken to use only vertically-growing cuttings-wood obtained from plants with their leading stems pegged down horizontally.

(H).—Fibres

(i) MANILA HEMP

255. In a variety trial on poor soil at Serdang the variety Tangongon has given the highest yield of fibre and is undoubtedly the most promising clone for Malayan use. Yields are summarized in the following table for the period December, 1951, to August, 1953:

Variety	Yield of Strippable Stems with Butt (lb. per acre)	Yield of Fibre (lb. per acre)	Percentage Fibre in Stems
Tangongon ..	68,877	1,151.0	1.67
Serdang C ..	96,121	932.2	0.97
Serdang A ..	44,975	441.1	0.98
Baguisanon ..	17,210	176.7	1.03
Bangulanon ..	8,165	132.4	1.62
Serdang B ..	15,561	83.0	0.53

256. Although the yield of fibre continues to improve, Tangongon has only yielded 831 lb. per acre in the past twelve months. The minimum yield normally considered economic is 1,120 lb. per acre per year. However, it is certain that greatly increased yields would be obtained on a more suitable soil.

257. In this trial, yields of stems without butts have not been recorded until recently, when figures indicate a true extraction rate of about 2.57 per cent. of fibre to stem for Tangongon.

258. Growth of hemp at Sungei Ruan, in Pahang, has been very satisfactory but the experiment is not yet in bearing.

(ii) RAMIE

259. A variety trial at Temerloh, Pahang, has been completed and another at Sungei Burong, Selangor, has been abandoned. Except under market garden conditions, yields are disappointing, although the technique of mechanical stripping has been largely mastered at Serdang.

(iii) JUTE

260. A manurial trial with Segama jute was completed early in the year on muck soil at Sungei Burong Agricultural Station, Selangor. The mean yield was 848 lb. per acre of dry fibre but an application of $3\frac{1}{2}$ cwt. per acre of sulphate of ammonia increased this yield to 1,038 lb. per acre. A sample of this fibre was submitted to the Colonial Products Advisory Bureau and received a favourable report. Suggestions for improvement are being tested in further trials.

261. When Segama jute is grown for seed on inland soils it has been found essential to grow it on fresh land in order to achieve control of root nematodes. Plant protection measures are also required against attack by mites and by Collar Canker, *Colletotrichum capsici*.

(iv) NEW ZEALAND FLAX

262. A small observation crop of *Phormium tenax* has grown well at the Federal Experiment Station, Cameron Highlands.

(I).—Fruits

(i) BANANA

263. Three factorial manurial trials are in progress in the Federation. The first to be planted was that at Ampang Tinggi, Negri Sembilan, which was attacked by Panama Disease during the year. The susceptible variety *Pisang Embun* is being replaced gradually with *Pisang Mas*. Growth at Ayer Hitam, Johore, has been satisfactory but early vigour was found to vary considerably with size of planting material. Cropping in this experiment commenced in November. The third experiment was planted during the year at the Federal Experiment Station, Cameron Highlands, with *Pisang Serendah* (*Musa nana*). Early growth was satisfactory.

(ii) RAMBUTAN

264. Variety trials are in progress at Degong and Ipoh. Perak, and at Serdang, Selangor. The best yielding clones have been R. 1, 9 and 5 at Degong, R. 5, 1, 86 and 6 at Ipoh and R. 86, 10 and 3 at Serdang. Altogether 18 clones are under trial. Great difficulty has been experienced with quality assessments as opinions vary widely. It is evident, however, that clone R. 11, although producing a beautiful fruit, is unsuitable for dessert because of its acidity; however, this characteristic has been found to make it a good canning variety.

(iii) OTHER FRUITS

265. The quality of King Oranges in a factorial manurial trial at Degong has been disappointing although the fruit are of excellent appearance.

266. Budded plants of 15 mango and kwini clones are being raised at Degong, Perak, in preparation for a variety trial.

267. A durian variety trial has been superimposed on a cacao seed garden at Degong Agricultural Station, Perak.

268. Sapucaya seedlings have proved to be difficult to establish in a multiplication plot at Serdang and growth has been very irregular.

269. *Actinidia chinensis*, the Chinese Gooseberry, has been established at Cameron Highlands but the plants lack vigour and have not yet fruited.

270. Cashew nuts of three varieties have grown very well on poor sandy soil at the Federal Experiment Station, Ayer Itam, Penang.

271. In a mulch and variety trial of strawberries, at Cameron Highlands, the Cambridge seedling No. 448 has outyielded Nos. 560 and 261, and the use of a paper mulch led to a marked increase in yield of fruit in spite of some association, in wet weather, of fruit-rot with mulching.

(J).—Fodder Grasses

272. All Serdang experiments were continued and were reviewed in November. Pre-war yields of Guinea grass were of the order of 16 to 20 tons of fresh grass per acre per year at this locality; methods of doubling this yield have been discovered and there is substantial evidence that yields can be further increased by a considerable amount. Factors under investigation were manuring, inter-row cultivation, irrigation and variety; of these, manuring exerted the greatest influence on yields.

273. Different methods of mechanical intercultivation have not led to any difference in yield as compared with hand intercultivation. Similarly, irrigation had no effect on yields nor, surprisingly, did it appreciably influence variability in the yields per six-weekly cut throughout the year.

274. Sulphate of ammonia and muriate of potash were the most effective fertilisers in increasing grass yields and it seems fairly clear that quantities of both, of the order of 4 to 8 cwt. per acre per annum, are needed for heavy yields on Serdang soils. Cattle manure was effective in increasing yields, in improving the efficiency of inorganic fertilisers and in prolonging the economic life of fodder grasses.

275. It was shown that the variability in pattern of yields per cut over the year could be considerably reduced by increasing the frequency of fertiliser application.

(K).—Leguminous Fodders, Green Manures and Cover Crops

276. Stylo, *Stylosanthes gracilis*, is well adapted to the north-east monsoonal climatic zone as it appears to be capable of giving good yields on poor soils even in dry weather. An observation plot at Kota Bharu, Kelantan, has given yields of the order of 28 tons of fresh green fodder per acre per annum without application of any fertiliser. The optimum method of harvesting appears to be a cut every 8 weeks at 6 inches above ground. Lower or more frequent cuts tend to kill out the crop in patches.

277. The first cut in a Stylo manurial trial at Bachok, Kelantan, was taken in July, but this site is liable to flooding and yields are lower than elsewhere.

278. A Stylo ley is one of the intercrops being tested with hedge-planted rubber at the Federal Experiment Station, Gajah Mati, in Kedah. Initial growth and establishment at that locality have been very promising indeed.

279. Much use is being made of *Leucaena glauca* as a fodder-legume at Serdang. The hybrid *L. glabrata* $\times$ *glauca* is now being multiplied as it appears to be much more vigorous than its male parent.

280. The tall-growing *Sesbania aculeata* is reported to be of great promise as a green manure for padi fields at Telok Chengai, Kedah. It grew better than *S. speciosa* and stood up well to wet soil conditions in April.

281. The newly imported, thornless variety of *Mimosa invisa* has been under observation in several localities. It is not an efficient smother crop when old but it may well be of value in the reclamation of old mining land. Unfortunately, it has not yet produced seed in quantity.

282. *Desmodium scorpiurus*, from New Guinea, has shown promise at the Federal Experiment Station, Kuala Lumpur, as a non-climbing cover crop and stocks are being multiplied. Since it does not produce seed it is propagated from cuttings, which root quite easily. It is somewhat slow in establishing itself unless planted thickly, and regular weeding is required until the ground is covered.

(L).—Pastures

283. The most important pasture experiment in progress at Serdang is a factorial manurial trial with NPK fertilisers applied at three levels and the grass cut at monthly intervals. The $N_2 P_0 K_2$ combination is the most satisfactory and yields equivalent to about 20 tons of fresh grass per acre per annum have been recorded. The sward consists largely of *Axonopus* spp. with some *lalang* under well-grown shade of *Enterolobium saman* spaced 40×40 ft.

284. In two shade and variety experiments there has been some deterioration recorded since *lalang* is increasing in quantity and some of the shade trees of *Gliricidia sepium* have been killed by root disease.

(M).—Vegetables and Food Crops

285. A series of variety trials at Cameron Highlands and in Selangor has shown that certain Japanese or Indian seed of four locally grown vegetables can replace Chinese seed and that yields would be equal or superior to those from standard varieties. A second and larger seed importation has since been made and growers' trials are in progress.

286. The Kedah brinjal variety has performed best in a Selangor variety trial.

287. Variety trials of soya beans have been carried out at Serdang and Kuala Lumpur and good crops have been recorded. This series of experiments is now nearly complete.

288. In rotation experiments on deep peat at Jalan Kebun, Selangor, both maize and sweet potatoes have grown quite well, especially where the peat has been given a surface burn twice a year.

289. Yates' Jubilee hybrid cabbage has shown great promise at Cameron Highlands and propagation from cuttings is now under trial.

290. An important investigation has been in progress at Cameron Highlands in an attempt to devise an acceptable manurial system which is not associated with excessive fly breeding. Treatments under test were:

- A, 5 tons prawn dust per acre per year plus lime.
- B, 3 tons Sterameal Black Label per acre per year plus lime and inorganic fertiliser.
- C, 3 tons ground bean cakes per acre per year plus lime and inorganic fertiliser.

Yields from the first four crops showed that mixture C was the best for cabbage and beet but that mixture B was best for French beans. Both these manures are very much cheaper than mixture A, so it would seem that prawn dust can be replaced economically without reduction in yield. It has also been demonstrated that the adoption of relatively deep placement of dry fertiliser minimizes, or possibly eliminates, fly breeding.

(N).—Miscellaneous Crops

291. Conophor nut vines have been in bearing at Serdang but the yield has been poor and some vines have died. Growth has been more vigorous at Gajah Mati, Kedah, and the first crop is expected early in 1954.

2.—LIVESTOCK

(A).—Goats

292. The Serdang herd consisted of 150 animals in November, of which 29 were pure-bred British Alpine, Saanan, Toggenburg or Anglo-Nubian goats and 101 were cross-breeds, ranging from half to seven-eighths imported blood. A total of 22 surplus males was distributed of which three each were pure-bred and seven-eighths bred and the balance three-quarters bred.

293. Pure-bred and cross-bred does have given very satisfactory milk yields but it is now evident that none of the pure-bred goats breeds or thrives really well in the lowlands with the possible exception of the British Alpine. The least satisfactory type is the Toggenburg, and it has been decided to discard this breed. Cross-bred animals are more hardy and prolific than pure-breeds.

294. A feeding trial using castrated, half-bred British Alpine and half-bred Saanan bucks has shown that such animals reach 80 lb. liveweight in 10½ to 12 months on a balanced ration or in 13½ to 15½ months on a *kampong* ration. Those on a balanced ration killed out at 47.6 to 50 per cent. and those on *kampong* ration at 43.1 to 44.7 per cent. The former gave a better quality carcass which was associated with a premium of 10 to 20 cents per kati liveweight. The rates of growth recorded are far superior to those of local goats.

(B).—Pigs

295. A trial of the effects of an aureomycin and vitamin B.12 feed supplement on growth rate and conversion efficiency was started early in the year and is still in progress. No very substantial effects of the supplement have yet been detected, possibly because the basic ration contains a large proportion of animal protein.

296. Another proprietary feeding supplement has been under trial at Cameron Highlands and the investigation was completed in

May, after 18 replicates of three weaners for each treatment had passed through the trial. The experimental period was confined to the first 14 days after weaning, and weight increases are recorded in the following table:

<i>Increase in Weight in Lb. per Pig</i>									
Litters		Control		Treated		Mean		Treated- Control	Standard Error
I-VII		1.17	..	2.10	..	1.63	..	0.929	±0.27902
		±0.19730							
VIII-XVIII		5.41	..	5.55	..	5.48	..	0.136	±0.53787
		±0.38033							

For some reason not yet determined, probably a management or climatic factor, the first seven litters made very poor liveweight gains, whereas the subsequent litters did well. It is interesting to note that only during the unfavourable period was the feeding supplement of significant value; when weaners were doing well they did not benefit from the supplement.

297. Two Large Black, one Large White and two Wessex Saddleback boars have been imported from the United Kingdom for experimental purposes.

298. Additional pig-sties have been constructed at Serdang to enable the scope of investigations to be expanded.

(C).—*Bali Cattle*

299. Recording of behaviour continues on the Serdang herd but no investigations have been carried out. One bull and six heifer calves were born. Two cows died of arsenical poisoning and five cows in calf or with calf at heel have been distributed to State Agricultural Officers.

300. A few animals were put out to rough grazing in an abandoned oil palm area during the second-half of the year. They were provided with a wood and palm-thatch shelter and fed a supplement of cut fodder grass only. After some initial loss of condition they settled down and now appear to be doing quite satisfactorily.

(D).—*Poultry*

301. An antibiotic feed supplement fed to growers in the presence and absence of animal protein has been under test at six localities and the investigation is nearing completion. No differences due to the supplement have yet been detected but it seems clear that growers fed on animal protein mature earlier, and perhaps grow faster, than those fed on vegetable protein. However, this observation is subject to confirmation when all results have been received.

C.—EXTENSION AND ADVISORY WORK

1.—CROPS

(A).—*Rubber*

302. The first full year's work has now been completed under the Smallholders' Rubber Replanting Scheme. The field officers of the Department of Agriculture are closely concerned with the working of the Scheme. In all States and Settlements they serve on the Rubber Replanting Committees either as members or chairmen.

303. The programme of this Scheme aims at replanting 500,000 acres in six years. It is clear that there is no lack of awareness of the existence of the Scheme or the need to replant. At the end of the year, grants had already been paid or approved for the replanting of a total of 26,000 acres, which means that this area has already been felled and prepared for planting. A total of 21,971 acres has been replanted, and there are a further 7,400 acres on which work is known to be in progress. These figures are short of the 50,000-acre target for the year, and although the acreage for which applications have been received and approved shows a satisfactory response from the rubber smallholders, there will usually be, in extension work of this nature, a lag between intention and fulfilment.

304. The most direct service which the Department has undertaken is the production of improved planting material from monies provided by Fund B. Budwood nurseries are maintained at the State and Settlement Agricultural Stations and the Experiment Station of the Rubber Research Institute. The production of clonal seedlings is usually undertaken, either by direct labour or by contract, in large central nurseries whence the seedlings are pulled and transported by lorry to the smallholders. In Pahang, however, the State Agricultural Officer has organised *kampung* nurseries on a scale and with a degree of success that is a cause for satisfaction both to the Department and the smallholders. Large-scale nurseries are troublesome to administer by direct labour, and contracts are sometimes difficult to place. Moreover, the smallholder is charged 15 cents per seedling, a price which must include profit and a safe margin for the usual hazards in agriculture. There can be little doubt that a careful smallholder could produce well under that price on the garden scale necessary for his needs. An area of 30 to 35 sq. yd. should produce more than enough seedlings for one acre, and there is the additional big advantage of having seedlings on the spot to be transplanted when the weather is most favourable. This approach to the problem should be extended, but, unfortunately, past attempts have too often resulted in a low outturn, and so long as clonal seed is scarce, proposed changes in methods will be approached with caution.

305. Clonal seedlings continue to be the more popular type of planting material and strenuous efforts are made to increase supplies. There are, however, many factors that influence production of seedlings, some of which are: (a) weight of seedfall, (b) viability of seed, and (c) weather conditions when nurseries are being established. Rubber seed quickly loses its viability and it must therefore be germinated and planted out soon after collection. Dry weather at seed-fall creates a difficult problem.

306. The following tables give the total acreages of replantings and new plantings on smallholdings and distribution of planting material for the past four years:

			Replantings (acre)	New Plantings (acre)				
1950	..	..	3,499	..	3,581			
1951	..	..	3,778	..	5,588			
1952	..	..	4,250	..	6,725			
1953	..	..	21,971	..	6,339			
			1950	1951	1952	1953		
Budwood (yards)	..	37,176	..	39,489	..	46,936	..	68,105
Clonal seedlings	..	1,123,279	..	1,575,797	..	1,535,715	..	1,773,388
Germinated seeds	..	192,518	..	1,131,093	..	400,000	..	893,750

307. The importance of proper maintenance after replanting is fully recognised by the Department and the Replanting Board. Progress payments from the replanting grant are withheld for instance if the land is infested with *lalang*.

308. Farmers are encouraged to take payments of the replanting grant in kind instead of cash, and in addition to the debits for planting material, approved fertilisers are also supplied and charged to the individual's account. Fertilisers are provided by these means both for young rubber and for the other approved crops substituted for rubber under the Replanting Scheme.

309. The Department continues to advocate a policy of greater diversification, and the following crops, with the approval of the State or Settlement Agricultural Officer concerned, can be planted in substitution for rubber and receive the full subsidy—padi, coconuts, coffee, fruit, pineapples and sago.

310. During the year, applications were approved for 543 acres of alternative crops, and by the end of January, 1954, applications for a further 1,200 acres had been received. For smallholders, the most common alternative crops are coconuts on coastal clays and coffee on muck soils and coastal clays. Outside these rather special muck soils and coastal alluvium areas, suitable alternative crops are a difficult subject on which to offer advice. The inland soils of Malaya are notoriously poor in plant nutrients, and following one rubber crop, another crop of rubber is too often the only crop that the planter feels confident he can establish with success and reasonable ease. Progress therefore in the diversification of agriculture on the old rubber lands has been understandably slow.

311. There has been little real progress in co-operative or other marketing schemes for the purchase and processing of smallholders' rubber. Many schemes exist throughout the Federation, ranging from true co-operative purchasing and processing societies to bulking and purchasing of latex schemes developed by commercial concerns. The advantages to the smallholder and the industry are obvious but the sum total of all rubber handled by these schemes is small, and there are no immediate grounds for believing that new and important developments are impending.

(B).—Padi

312. Padi extension services can be most conveniently discussed under the three headings of varieties, fertilisers and cultivation. Conditions of climate and soil vary considerably throughout Malaya and in consequence the extension services of any one area depends largely upon the progress of experiments and research conducted in the experimental stations that serve the needs of the area.

313. *Variety Improvement*.—Varietal trials of local and introduced varieties are first conducted on the experimental stations. Likewise selection by the pedigree ear to row method of varieties which are judged to be the most important for the area; from this work new high-yielding "pure strains" are produced as the result of work that may take seven to ten years to complete. The first step in extension work on proved varieties or pure strains is the laying down of extension trials on padi planters' land. This work is important, it is the essential preliminary to the multiplication

and bulking of the improved varieties for massive distribution, as it is necessary to see how the varieties behave on cultivators' own land in the varying conditions found in the area.

314. The padi stations also maintain multiplication areas of varieties that are in demand; these are grown in simple multiplication plots or become available for distribution after use in fertiliser and agronomic experiments. During the year 29,060 gantangs (gallons) of improved padi seed were distributed.

315. Varietal selections and variety trials continue in all States and Settlements in Padi Experiment and Test Stations that may either be financed by State or Federal funds.

316. Extension trials with new pure strains have commenced in Negri Sembilan. 150 plots were laid down throughout the State; each trial tested three of the most promising Serendah Kuning selections against unselected Serendah Kuning. These have aroused considerable interest as there are quite striking visual differences between the new strains and the unselected padi.

317. In other States and Settlements extension trials have been laid down with the object of demonstrating or further testing varieties that have done well on Experiment Stations. In Kedah, extension plots of SSD. 25 were laid down on cultivators' own land in 59 localities and 10 plots were planted with Subang Intan 117. The variety SSD 25 which had been most promising in trials on Experiment Stations was disappointing in the extension trials.

318. In the 1952/53 season, 60 trial plots of Seri Raja padi were established in South Krian. The trials were successful, increases in yield over local varieties ranging from 5.7 to 18.3 per cent. being obtained. In the current season, the trials have been increased to 103. More complex trials with Seri Raja, Mayang Sabatil, Pahit and popular local varieties have been laid down at 19 centres in the riverine mukims of Perak.

319. In Malacca there were 82 seed farms of one acre each under the management of selected local farmers. These were planted with Reyong 6, Siam 29, Serendah Kuning 3 and Nachin 11, all proved varieties which are in demand in the Settlement.

320. *Fertiliser*.—A comprehensive series of fertiliser experiments are being carried out on Experiment Stations throughout the Federation. These have reached the stage of positive recommendations in Kelantan, Trengganu and Kedah.

321. Rapid developments in the use of fertilisers is likely to be difficult to achieve even though striking results from their application can be demonstrated. Striking results have been achieved in the east coast States of Kelantan and Trengganu, yet in the second year of the Padi Fertiliser Subsidy Scheme only 710 tons of fertiliser were sold. This disappointing result was due in part to most unseasonal weather which made the cultivators reluctant to make purchases. There are however other factors involved, as sales should begin before the onset of the rains and opinions formed on the crop prospects. Lack of ready money at a time of year when funds are at their lowest in the average peasant household is probably the main reason. Also the inadequacy of internal roads for easy transport to the fields, and the uncertainty that surplus padi can be easily sold are other reasons.

322. As can be expected the largest increases in yield have been on the poorest soils where the farmers are also likely to be short of ready cash. In the naturally higher-yielding areas of the West Coast, in Kedah, Perlis, Province Wellesley and North Perak positive results from the use of fertilisers have been more difficult to obtain and the increases in yield of a lesser order than those obtained in the East Coast. Nevertheless local phosphatic guanos, of variable composition, have been used for generations in Kedah, Perlis and North Province Wellesley. As a result of field experiments the Department is encouraging the use of rock phosphate followed by sulphate of ammonia as a top dressing, and direct purchases of these fertilisers are being made by progressive farmers. Demonstration plots were also laid down in cultivators' own land throughout the State. Fifty plots were carried over from the previous season and received only nitrogen in order to gauge the residual effects of the previously-applied phosphates, and in addition one hundred new plots were laid down and treated with three different forms of phosphate and a nitrogen top dressing.

323. In other areas, extension work in the use of manures is still confined to trials and demonstrations, and considerable numbers of these have been laid down, e.g. Perak 71, 31 combined with simple varietal trials; Negri Sembilan 50, Perlis 25, Malacca 120, and Trengganu 133 using the mixed fertilisers recommended for the East Coast and used in the Subsidy Scheme.

324. *Cultivation*.—Off-season cropping with crops other than padi is an established custom in Selangor, Malacca and Province Wellesley, although in Province Wellesley double cropping with padi is more common. The Department strongly encourages this practice as it is known that subsequent padi crops benefit from off-season dry cultivation. Further, the cash returns from such high priced crops as vegetables, chillies, ginger, soya beans and maize can give a real degree of prosperity to the smallholder working only 2 to 3 acres of padi land.

325. The Department organised an off-season padi cropping trial in the Salor Irrigation area, Kelantan. In spite of poor attention given by the cultivators, the results left no doubts that double cropping is feasible in that area.

326. Progress in mechanical cultivation has varied considerably in the various States and Settlements. During 1953 some 4,250 acres of padi land were mechanically cultivated in the Federation by tractors owned either by the Department or the Rural and Industrial Development Authority. In addition it is known that further areas were cultivated by private contractors. Most progress has been made in Perak which contributed 2,000 acres to the above totals.

327. In Kelantan, only 344 acres of padi land were ploughed and 133 acres harrowed by the Rural and Industrial Development Authority tractors. This is disappointing; in Kelantan, conditions are favourable for cultivation by light, wheeled tractors and it has been shown that the deeper cultivation of tractor ploughing increases yields significantly in the dry padi areas.

328. *General*.—Extension work on padi takes many other forms which are not easily tabulated or expressed in statistics. The influence of the Field Branch (Agricultural Assistants and

Agricultural Subordinates) is brought to bear in many ways that affect both yields and the acreage planted. Intensive touring at planting time does influence the tardy planter, and bring about a more general adherence to the proper planting dates. There is knowledge on techniques which are known to increase yields, such as age of seedlings, spacing and nursery management; these are subjects which are effective talking points in lectures and advisory visits. Pest control, in particular rats in the padi fields, and damage by wild pig all form part of the routine field work of the Department.

(C).—*Planting Material, excluding Rubber*

329. During the year, 26,781 budded fruit trees were produced for sale and distribution, an increase of 10,000 over 1952. These consisted mainly of rambutans with smaller numbers of durians and mangoes.

330. In Selangor, a number of small extension stations have been opened within the last two years which sell budded and seedling fruit trees, shade trees and ornamentals.

(D).—*Amelonado Cacao Seed Gardens*

331. Work has continued in establishing Amelonado seed gardens in the States and Settlements. The total area planted is approximately 55 acres. These gardens have been opened with funds provided by the Governments of the States and Settlements and they are intended both as a source of improved seed for smallholders and as a demonstration on how to grow cacao.

332. In Perak, cacao seed gardens are being planted in conjunction with durian variety trials. It is considered that durian will provide a suitable top shade for the cacao; both crops require similar soil and growing conditions.

2.—MECHANICAL CULTIVATION

333. Progress in mechanical cultivation of smallholders' land, other than padi, has also varied considerably in the various States and Settlements. In this work Perak has again made the most progress; it is estimated that 2,500 acres were mechanically cultivated for dry land crops by tractors owned either by the Department or the Rural and Industrial Development Authority. Private operators are known to be in business in Province Wellesley, Perak, Malacca and Johore. Five Departmental tractors used in Selangor, mainly for opening up new land in the vicinity of new villages produced \$24,000 in revenue.

3.—LIVESTOCK

(A).—*Pigs*

334. During the year, 458 Middle White pigs were sold from Departmental centres. In last year's report it was stated that pig farmers were unwilling to raise pure-bred Middle Whites. This is still generally true and the Department does not encourage smallholders to breed from pure-bred or high grade sows, such development will come of its own accord. The view is widely held that the Middle Whites are poor mothers and it is customary to fatten and slaughter all pure bred gilts, and to keep stud boars only for the production of first-cross litters. In some of the more

progressive and old-established pig rearing areas there are now reports that breeders are changing their views and that high grade and pure breeding sows are giving satisfaction to their owners. There is some evidence that the strains of new blood that have been imported from the United Kingdom in the last two years are superior in prolificacy to earlier importations.

(B).—Poultry

335. In extension work in pure-bred poultry, the policy of the Department is to try and satisfy demand where it exists. Experiments in the performance and adaptability of imported breeds are most difficult to pursue to definite conclusions, and the view is now held that the proof is in the demand. Whereas in earlier years, the Department was the principal importer and breeder of pure-bred stock, there now exist numbers of commercial poultry farms in which nearly every important breed is represented.

336. On most of the Agricultural Stations, the extension work continues to be mainly confined to the sale of mature cockerels or hatching eggs. In Selangor, the State Agricultural Officer operates a scheme, sponsored by the Rural and Industrial Development Authority, which has made good progress during the year. A 2,700-egg incubator has been installed and a complement of brooders to carry chicks to two to three months of age, when they are vaccinated against Ranikhet disease and sold at a commercial price. Other States are considering similar projects for intensive production of poultry for sale. Under the same scheme in Selangor, day-old chicks have been imported from England by air for direct sale to the public.

337. During the year, sales were as follows: Cockerels and pullets 1,561; chickens 13,661; and 14,262 hen and 3,000 duck eggs.

(C).—Goats

338. The Department has had under trial, four imported breeds of goats, the British Alpine, Saanan, Toggenburg and Anglo-Nubian. Progress in building up herds of each has been slower than expected and in consequence the four breeds and their cross-bred progeny have not been tested as thoroughly as originally planned. Some extension work has commenced on a small scale in Kelantan, Selangor, Penang and Province Wellesley and Malacca with pure-bred and high-grade males put to stud. The building up of flocks has commenced on some Agricultural Stations by crossing local females with the imported males.

339. Of the four breeds, the Toggenburg has shown itself to be the least hardy and prolific and it has been decided to discard this breed and continue with the other three. Where a demand exists, the Department recommends the Saanan and the British Alpine for milk purposes and the Anglo-Nubian for mutton. The growth rates of these breeds are superior to the locals, but it is recognized that they are less prolific and hardy.

(D).—Fishponds

340. Throughout the Federation, the renewed interest in fresh water fish culture has been maintained. Ponds have been established at many Agricultural Stations and in new villages. Few countries

can be better adapted to this system of "farming" than Malaya. Over large areas, ponds can be created by simply making an excavation. Well-watered valleys and mining holes abound.

341. The Chinese, using pig manure, fertilise the ponds by traditional methods, and cut grass is fed to the carp. For the Malays, the imported *Tilapia mossambica* is the most suitable, and encouragement is given to combining stall-feeding of goats and cattle in conjunction with the fish ponds. The State Agricultural Officer, Kedah, reports that during the year 115 ponds were established in that State. Numerous loans have been granted by the Rural and Industrial Development Authority for the construction of ponds.

4.—PESTS

342. Some State and Settlement Departments of Agriculture maintain a separate cadre of Pest Destruction Staff, whereas in others, pest control is part of the routine work of the field staff.

343. Rats, bandicoots, squirrels, monkeys and wild pigs are the most troublesome pests. Except for the inevitable small local outbreaks due to natural causes or inertia on the part of the people, pests have in general been kept within reasonable bounds.

5.—NEW VILLAGES

344. The difficulties of re-settlement have now mainly been overcome, and the more immediate needs for land have been met. The Department has been able to extend its services more effectively in many ways. From funds controlled by the Member for Agriculture and Forestry, pig stud centres have been established and these are now functioning actively and the influence of the Middle White can be seen in nearly all pig-rearing villages. Tractors purchased from the same fund have been a very important factor in speeding the opening of the new fields. Although, however, the tractors are still available after the land is first opened, there has been little demand for their services in routine cultivation.

345. Small extension agricultural stations have been opened in several new villages and serve a most useful purpose. They cater for the needs of the Chinese farmer for pigs, poultry, fruit and shade trees, and as a centre on which the tractors are based.

6.—GENERAL AGRICULTURAL EDUCATION

346. Agricultural extension work has been described as rural teaching. A great deal of extension work does consist of lectures in local centres and individual advisory visits. As a rule, the average working farmer or community leader will not or cannot devote more time to acquiring new knowledge than is involved in local lectures and visits by the extension staff.

347. During the past two years, the Department has been working towards intensive residential courses in general agriculture to suit the needs of the peasant farmer and local headmen. Accommodation has been erected at Agricultural Stations in several States, and during the year all States and Settlements have submitted plans for the erection of hostels.

348. The courses are not stereotyped in either duration or form. In Kedah, for instance, there is a general course lasting

three months and more specialised courses in fruit or poultry lasting one month. During the past two years nearly every headman in the State of Selangor has undergone a general course at the Cheras Agricultural Station. The Selangor Department has also organised special courses on goat and poultry rearing; 137 trainees attended these courses of whom 29 were from other States.

349. In Perak, 14-day courses for headmen were run at the Degong Agricultural Station, attended by a total of 44 headmen.

350. These courses cannot be run without some financial assistance, as in all cases the trainees are transported free of charge, given free board and lodging, and in some cases paid an additional small allowance.

351. The Rural and Industrial Development Authority has made substantial financial contributions to the development of these educational courses held at Agricultural Stations.

352. In all States and Settlements the officers of the Department co-operated in Civics Courses. The need for these courses first arose in the new village and rehabilitation centres.

353. Officers of the Department in Perak and Penang have delivered lectures on agriculture to Government officers attending Summer Schools, held on a Pan-Malayan basis, in Taiping.

354. During the year, padi competitions were extended in all the main padi areas with eliminating shows at mukim, district and State or Settlement level. The winning entries from the State and Settlement shows were submitted for the Pan-Malayan Competition held under the auspices of the Malayan Agri-Horticultural Association in Kuala Lumpur.

355. General Agricultural Shows continue to be popular events in the districts. Their occurrence depends entirely upon local enthusiasm. In all cases the local staff of the Department play a leading part in the organisation and usually arrange a Departmental Stall.

356. In Kedah, the State Quarterly Agricultural News Letter was continued successfully. This publication, which started as a cyclostyled broadsheet of 2,000 copies, has grown to a multi-paged printed leaflet of 6,000 copies.

D.—AGRICULTURAL EDUCATION

1.—ADVISORY COUNCIL

357. The membership of the Advisory Council was strengthened by the addition of another Malay member, the Hon'ble Dato Abdul Razak bin Hussain. The Council met twice during the year, on the 27th January and 9th June.

2.—COLLEGE YEAR

358. The year was divided into three terms, as under:

3rd term, 1952-53, session—14th January to 15th April

1st term, 1953-54, session—16th June to 4th September.

2nd term, 1953-54, session—29th September to 12th December.

3.—REGISTER OF STUDENTS

359. The categories of students in training were composed as follows:

Register of Students, June, 1953

Category	Malays	Chinese	Indians	Others	Total
DIPLOMA COURSE					
THIRD YEAR STUDENTS (1951-54)					
Federal Scholars	1 ..	1 ..	— ..	— ..	2
Agricultural Subordinate Major Scholars, Johore	2 ..	1 ..	— ..	— ..	3
Agricultural Subordinate Major Scholars, Pahang	1 ..	— ..	— ..	— ..	1
Private Student, Federal	— ..	1* ..	— ..	— ..	1
Rubber Research Institute Student in training	1 ..	— ..	— ..	— ..	1
Assistant Rural Development Officers in training	6† ..	— ..	— ..	— ..	6
	11 ..	3 ..	— ..	— ..	14
SECOND YEAR STUDENTS (1952-55)					
Federal Scholars	6 ..	3 ..	3 ..	— ..	12
Agricultural Subordinate Major Scholar, Research Branch ..	1 ..	— ..	— ..	— ..	1
Agricultural Subordinate Major Scholar, Agronomy Branch ..	1 ..	— ..	— ..	— ..	1
Agricultural Subordinate Major Scholar, Kedah	1 ..	— ..	— ..	— ..	1
Rubber Research Institute Students in training	2 ..	3 ..	— ..	— ..	5
Singapore Scholar	— ..	1 ..	— ..	— ..	1
Assistant Rural Development Officers in training	3‡ ..	— ..	1‡ ..	— ..	4
	14 ..	7 ..	4 ..	— ..	25
FIRST YEAR STUDENTS (1953-56)					
Federal Scholars	6 ..	6 ..	3 ..	— ..	15
Private Students, Federal ..	— ..	2 ..	— ..	— ..	2
Rubber Research Institute Students in training	2 ..	— ..	— ..	— ..	2
North Borneo Student in training	1 ..	— ..	— ..	— ..	1
	9 ..	8 ..	3 ..	— ..	20
MINOR COURSE (1953-54)					
Probationer Junior Agricultural Assistants in training	13 ..	— ..	— ..	— ..	13
Laboratory Attendant in training, College of Agriculture	1 ..	— ..	— ..	— ..	1
	14 ..	— ..	— ..	— ..	14
GRAND TOTAL ..	48 ..	18 ..	7 ..	— ..	73

360. Of the above, one Federal Scholar (Chinese) of the second year Diploma Course had his scholarship terminated owing to unsatisfactory progress. One Rubber Research Institute Student in training (Malay) of the first year Diploma Course withdrew from the College owing to illness. One Probationer

* Resigned his scholarship and continued as a Private Student as from the 1st term, 1953-54, session.

† One admitted as from the 2nd term, 1952-53, session.

‡ Admitted as from the 2nd term, 1952-53, session.

Junior Agricultural Assistant in training (Malay) had his services terminated by the Selangor State Government owing to unsatisfactory progress at the College.

4.—TRAINING

361. The Minor Course was recommenced for the academic year 1953-54 to admit Probationer Junior Agricultural Assistants who under their terms of service must attend this course before they can be confirmed in their appointments.

362. The training in the Diploma Course followed the same general lines as before. Practical field work was carried out on the adjacent Federal Experiment Station, with the active co-operation of the officers staffing the Station. This is continuing to provide a valuable part of the training.

363. With the courtesy and assistance of the Rubber Research Institute, the second year students were accommodated at Sungei Buloh Experiment Station from the 29th September to the 9th October, where an intensive course was given in the more specialised and advanced phases of work on rubber. Visits were paid to nearby holdings and to the laboratories at Headquarters, Rubber Research Institute.

364. The Minor Course students spent three days at Tanjong Karang, Selangor, on padi work, and also assisted in carrying out a survey of the pineapple smallholdings at Meru, in the Klang district of Selangor.

365. Instructional visits were arranged to as many places as possible, and included—

Headquarters laboratories, etc., Kuala Lumpur.

Cheras Agricultural Station.

Padi areas and places of agricultural interest in Malacca, Penang and Province Wellesley, Perak, Cameron Highlands, and Tanjong Karang, Selangor.

Industrial areas in Klang and Kuala Langat districts of Selangor.

5.—HEALTH AND RECREATION

366. With the exception of the Rubber Research Institute Student in training who withdrew from the College owing to illness, the health of the students and labour force was good.

367. As the curfew has been extended to 11 p.m., it was possible to arrange for a bus to take in a party of students to Kuala Lumpur in the evenings once a week.

6.—CATERING

368. This has remained a staff responsibility.

7.—GENERAL

369. Cacao Instructional Courses for Department of Agriculture junior staff were held at the College on the 24th and 25th April and on the 1st and 2nd May.

370. Training Course for Ketuas Kampong from the 21st December, 1953, to the 9th January, 1954, were conducted at the College by the Rural and Industrial Development Authority.

E.—PUBLICATIONS AND LIBRARY

I.—PUBLICATIONS

371. The principal publications of the Department are *The Malayan Agricultural Journal* and Special Bulletins (General, Scientific, Economic, and Mechanisation Series). It was decided, during the year, not to attempt at present to resume publication of the three vernacular agricultural journals *Warta Perusaha-an Tanah*, *Ma Loy Chow Nung Nyip Tsung Poh* and *The Tamil Agricultural Journal*. In their stead, Department of Agriculture Notes are being supplied at regular intervals to the vernacular papers of the Department of Information Services, the Malay journal *Panduan Ra-ayat* and the Chinese journal *Farmer's News*.

372. The Publications Officer, who is Editor of the *Malayan Agricultural Journal*, has the advice and guidance of the Publications Committee of the Department, of which he is a Member and Secretary, and of the Sub-Committee for Vernacular Publications of which he is Chairman.

373. Publication of the *Malayan Agricultural Journal* was continued on a quarterly basis but, for various reasons, it was not found possible to print all numbers on time.

374. Only one Special Bulletin was issued during the year—Scientific Series No. 25 "Rice Variety Trials in Malaya, 1947-50" by L. N. H. Larter. No leaflets were issued during 1953 but a comprehensive series on poultry husbandry was in course of preparation.

375. The following is a summary of the publications of the Department printed in 1953, together with the number of copies sold or issued free:

English	Sales	Free and Exchange	Total
MALAYAN AGRICULTURAL JOURNAL—			
Vol. 36, No. 1	461 ..	873 ..	1,334
Vol. 36, No. 2	489 ..	860 ..	1,349
Vol. 36, No. 3	502 ..	863 ..	1,365
			4,048

SPECIAL BULLETINS (Printed)—

1. Rice Variety Trials in Malaya:

Scientific Series No. 25	6 ..	345 ..	351
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Malayan Agricultural Journal, Vol. 36, No. 4, is to be issued in January, 1954.

376. The following summary shows the number of back numbers of the various publications of the Department distributed during 1953:

	Sales	Free and Exchange	Total
Malayan Agricultural Journal	696 ..	784 ..	1,480
Malayan Planting Manual No. 2	80 ..	7 ..	87
Special Bulletins	314 ..	84 ..	398
Agricultural Leaflets	— ..	1,761 ..	1,761
Poultry Leaflets	— ..	54 ..	54
Grow More Food and Educational Series	— ..	1,497 ..	1,497
Malay Agricultural Journal	— ..	64 ..	64
Leaflets in Malay	— ..	3,365 ..	3,365
Chinese Agricultural Journal	— ..	165 ..	165
Leaflets in Chinese	— ..	1,012 ..	1,012
Tamil Agricultural Journal	— ..	289 ..	289
Leaflets in Tamil	— ..	713 ..	713
			10,885

377. The following is a summary of all publications sold and distributed during the year:

	Sales	Free and Exchange	Total
English	2,548	7,128	9,676
Malay	—	3,429	3,429
Chinese	—	1,177	1,177
Tamil	—	1,002	1,002
	<u>2,548</u>	<u>12,736</u>	<u>15,284</u>

378. Comparative figures for total revenue received during 1952 and 1953 from the sale of publications and from advertisements are as follows:

	1952		1953
	\$	c.	\$ c.
Sale of publications ...	7,118	56	5,333 29
Advertisements	1,804	00	2,090 25
	<u>8,922</u>	<u>56</u>	<u>7,423 54</u>

2.—LIBRARY

379. The Library contains about 3,500 books and reports published in book form and nearly 28,600 volumes of periodicals. There are approximately 1,050 unbound volumes of periodicals which are of earlier years and incomplete. The Library also contains many thousands of pamphlets and reprints. Approximately, 1,350 periodicals are available.

380. Over 150 periodicals and all annual reports are circulated to members of the staff as they are received.

F.—SCHEMES SPONSORED UNDER THE COLONIAL DEVELOPMENT AND WELFARE ACT (U.K.)

381. Brief particulars are given here of development schemes in progress under the control of the Department of Agriculture, Federation of Malaya.

382. *Scheme D. 1176.*—A grant of £121,786 (\$1,043,875) was approved for a scheme for the provision of improved rubber planting material to smallholders. This scheme, administered with the co-operation of the Rubber Research Institute of Malaya, included the training of selected youths from rural areas in all aspects of rubber cultivation, to form a nucleus of instructed individuals to return to their villages after training. The scheme was originally designed to cover a five-year period, but it was decided to bring it to an end on the 31st March, 1953, at a total cost of \$1,098,954.32. Expenditure in 1953 was \$133,616.96. When this scheme came to an end, the Rubber Industry (Replanting) Board undertook the financing of the supply of planting material to smallholders both for replanting and new planting.

383. From the inception of the scheme in August, 1949, to the end in 1953, the following quantities of material were distributed to smallholders throughout Malaya: 170,545 yd. of rubber budwood, 5,461,661 clonal seedling stumps and 1,816,196 germinated clonal seeds.

384. *Scheme D. 1220.*—A grant of £10,500 (\$89,930) was approved for the establishment and maintenance, for a five-year period, of an Isolation Nursery, initially for cacao, on the island of Pulau Tekong, off Singapore. The Station is intended to serve the phytosanitary needs of British South-East Asian territories by the preliminary quarantine of their imports of selected planting material. Since the Station was opened, planting material of cacao has been received, planted, raised and distributed to Pan-Malayan and other territories. In addition, consignments of selected planting material of crops other than cacao have been received from other countries for quarantine prior to their introduction into the Federation. This scheme has been completed according to schedule at a total cost of \$67,774.71, the expenditure for 1953 being \$9,585.66.

SECTION V

AGRICULTURAL LEGISLATION

1.—THE RUBBER INDUSTRY (REPLANTING) FUND ORDINANCE, 1952

385. Scales of grants to smallholders for replanting with crops other than rubber.

386. Legal Notification 473 of 22nd August, 1953, refers.

2.—THE AGRICULTURAL PESTS AND NOXIOUS PLANTS ORDINANCE, 1953

387. An ordinance to consolidate and amend the laws relating to the protection of plants and cultivated products from disease and pests and to provide for the destruction of pests and noxious plants.

388. Ordinance No. 59 of 1953 refers.

O. J. VOELCKER,
*Director of Agriculture,
Federation of Malaya*

APPENDIX I

COMPARATIVE ACREAGES OF AGRICULTURAL CROPS

	1948 Acres	1949 Acres	1950 Acres	1951 Acres	1952 Acres	1953 Acres
Rubber	3,362,525	3,364,460	3,358,251	3,535,221	3,612,820	3,727,540
Oil Palm	83,320	90,507	93,331	97,933	100,182	108,265
Coconut	510,824	499,610	509,289	509,306	512,967	512,744
Padi (Rice)	885,484	908,070	930,530	875,390	831,050	834,010
Total	4,842,153	4,862,647	4,891,401	5,017,850	5,057,019	5,182,559
FOODCROPS:						
Tapioca	41,693	41,341	35,461	27,411	23,428	28,183
Sweet Potato	21,619	18,922	17,091	10,843	13,449	16,735
Sago	6,693	6,738	6,224	6,467	6,364	6,826
Sugar Cane	3,297	2,346	1,989	2,055	1,861	2,008
Groundnut	1,556	1,027	1,755	1,943	2,479	2,485
Maize	1,117	806	2,583	2,997	7,332	4,224
Yam	836	621	1,107	1,077	1,101	1,099
Colocasia	3,711	3,354	2,892	3,072	3,390	3,404
Ragi	72	37	*	39	25	111
Soya Bean	186	63	*	106	117	152
Pulses	854	548	*	784	1,569	1,945
Vegetable (Market Gardens)	15,205	13,167	10,844	10,671	12,640	14,910
Total Foodcrops	96,839	88,970	79,946†	67,465	73,755	82,082
FRUITS:						
Pineapple	16,082	17,239	23,981	24,468	24,843	26,846
Banana	59,950	57,629	48,150	39,988	40,257	48,508
Cashew Nut	2,219	2,049	2,207	2,102	2,120	2,105
Specified Fruits	25,288	32,914	66,547	*	*	*
Mixed Fruits	85,348	77,264	34,940	*	*	*
Durian	*	*	*	25,270	26,652	27,394
Rambutan	*	*	*	14,779	15,848	17,951
Mangosteen	*	*	*	7,342	8,025	8,561
Citrus Fruits	*	*	*	2,064	2,312	2,854
Other Mixed Fruits	*	*	*	41,823	41,889	42,314
Other Fruits under Sole Crop	*	*	*	2,925	2,210	—
Total Fruits	188,887	187,095	175,825	160,761	164,156	176,533
SPICES:						
Arecanut	50,194	48,957	48,391	47,659	44,862	46,300
Chillies	3,159	2,490	2,291	2,212	3,258	3,768
Pepper	75	80	148	156	204	377
Cardamom	7	5	2	1	—	1
Ginger	1,562	1,447	1,238	976	1,013	974
Sireh	2,418	2,438	2,768	2,729	2,900	2,983
Nutmeg	87	70	77	80	59	55
Cloves	288	293	283	226	195	183
Turmeric	1,174	1,120	889	838	731	959
Total Spices	58,964	56,900	56,087	54,877	53,222	55,600
MISCELLANEOUS:						
Tea	9,516	9,413	8,434	8,497	9,561	8,719
Coffee	7,047	9,507	8,951	7,435	9,299	9,286
Cacao	*	*	*	531	295	302
Tobacco	1,294	1,457	408†	2,109	3,830	2,579
Derris	234	297	571	428	244	426
Nipah	27,238	33,438	33,559	33,472	33,749	34,105
Gambier	387	532	986	831	932	908
Kapok	1,814	1,770	1,720	1,567	1,411	1,675
Ipecacuanha	678	257	219	179	250	143
Patchouli	109	32	37	16	8	37
Citronella	33	20	12	19	27	29
Gutta Percha	5,635	5,635	3,471	5,635	5,635	5,635
Other Miscellaneous	508	753	657	1,213	1,437	1,448
Total Miscellaneous	54,493	63,111	59,025	61,932	66,678	65,292
TOTAL ALL CROPS	5,241,336	5,258,723	5,262,284	5,362,885	5,414,830	5,562,066

* Not available.

† Incomplete.

APPENDIX II

DEPARTMENT OF AGRICULTURE, FEDERATION
OF MALAYA

STAFF LIST AS AT 31-12-53

Director of Agriculture: O. J. Voelcker, C.B.E., M.A., A.I.C.T.A.
Deputy Director of Agriculture: R. G. Heath, B.Sc. (Agr.), A.I.C.T.A.
Administrative Officer, Headquarters: H. F. Logan.
Office Assistant: (Vacant)—V. Sundram (*Acting*).
Financial Assistant: K. V. Thuraisingam.

RESEARCH BRANCH

Chief Research Officer:
 R. B. Jagoe, B.Sc. (Hons.)

(II) BOTANY

Senior Botanist:
 L. N. H. Larter, B.Sc. (Hons.), A.R.C.S.,
 A.I.C.T.A.
 (*On leave*).
 E. A. Rosenquist, M.A., Dip. Agr. Sci.
 (Camb.) (*Acting*)

Botanists:
 F. B. Brown, B.Sc. (Hons.), Dip. Agr. Sci.
 (Camb.)
 E. A. Rosenquist, M.A., Dip. Agr. Sci.
 (Camb.)
 Chew Hong Jung, B.Sc., B. Agri.
 *W. F. Grant, M.A., Ph.D.
 Miss R. A. Upton, B.Sc. (*Temp.*)

Assistant Research Officer:
 Tak bin Haji Daud.

(III) CHEMISTRY

Senior Chemist:
 Gunn Lay Teik, O.B.E., M.A. (Cantab.)

Chemists:
 G. Youatt, B.Sc. (Hons.), Ph.D.
 Mrs. V. R. Fairbank, B.Sc. (Dunelm) (*Temp.*)

Assistant Chemist:
 K. Kanapathy, B.Sc. (Hons.), (Annamalai
 University). (*On Scholarship Course in
 Australia*).

(IV) CANNING RESEARCH

Canning Officer:
 A. E. Billington, M.A., A.R.I.C.
 (*On leave*).

(V) SOIL SCIENCE

Senior Soils Chemist:
 (*Vacant*).
 J. K. Coulter, B.Sc., B. Agr., Dip. Agr. Sci.
 (Camb.), A.R.I.C. (*Acting*).

Soils Chemists:
 J. K. Coulter, B.Sc., B. Agr., Dip. Agr. Sci.
 (Camb.), A.R.I.C.
 A. R. McWalter, B.Sc. (Hons.).
 G. W. Arnott, B.Sc. (Hons.), D.T.A. (Trin.).

Geologist (Soil Survey):
 W. P. Panton, B.Sc. (Hons.), D.T.A. (Trin.).

Assistant Research Officer:
 Haji Abdul Wahid bin H. Jaffar.

(VI) ENTOMOLOGY

Senior Entomologist:
 H. T. Pagden, M.A., F.R.E.S.

Entomologists:
 R. J. A. W. Lever, B.Sc. (Hons.) (Dunelm),
 D.I.C. (Lond.), A.I.C.T.A., F.L.S. (*On
 leave*).
 I. J. Wyatt, B.Sc. (Hons.), D.T.A. (Trin.).

Assistant Research Officer:
 Kamardin bin Bahar.

(VII) PLANT PATHOLOGY

Senior Plant Pathologist:
 (*Vacant*).
 A. Johnston, B.Sc. (Hons.), A.I.C.T.A.,
 A.L.S. (*Acting*).

Plant Pathologist:
 A. Johnston, B.Sc. (Hons.), A.I.C.T.A.,
 A.L.S.
 *W. J. Cherewick, B.S.A., M.S., Ph.D.

FIELD BRANCH

Chief Field Officer:
 J. R. Curry, Dip. Agr. Sci. (Dunelm), N.D.A.

Agricultural Economist:
 T. B. Wilson, B.A., Dip. Agric. Econ. (Oxon),
 D.T.A. (Trin.).

Personal Assistant to Chief Field Officer:
 Yoon Weng Kong.

KEDAH—*State Agricultural Officer (Kedah
 and Perlis):*
 P. G. Coleman, B.A., A.I.C.T.A. (*Acting*).

Agricultural Officer:
 J. L. B. Hitchcock, B.Sc. (Dunelm).

Assistant Agricultural Officers:
 Mohd. Salleh bin Musa.
 Salim bin Mohd. Akib.

KELANTAN—*State Agricultural Officer:*
 J. Cook, B.Sc. (Hons.), A.I.C.T.A.

Assistant Agricultural Officer:
 Mahmud bin Haji Yaacob.

TRENGGANU—*State Agricultural Officer:*
 A. L. Barcroft, B.Sc.

Assistant Agricultural Officer:
 Jaafar bin Mampak.

PENANG AND PROVINCE WELLESLEY—*Settlement
 Agricultural Officer:*
 J. S. Ure, B.Sc. (Agr.), D.T.A. (Trin.).

Assistant Agricultural Officer:
 Min bin Haji Ahmad.

PERAK—*State Agricultural Officer:*
 H. J. Simpson, B.Sc. (Agr.), Dip. Agri. (Wye).

* Supernumerary appointments under the Colombo Plan.

APPENDIX II—(cont.)

FIELD BRANCH—(cont.)*Agricultural Officers:**Perak North—(Vacant).*Ismail bin Haji Md. Salleh, A.A.O. (*Acting*).*Perak Central:*L. A. Vivian, B.Sc., Dip. Agr. (Camb.),
D.T.A. (Trin.).*Perak South:*

T. R. Dickinson, B.Sc. (Agr.), D.T.A. (Trin.).

Assistant Agricultural Officers:

Ramly bin Haji Tahir.

Ismail bin Haji Mohd. Salleh.

*SELANGOR—State Agricultural Officer:*E. J. H. Berwick, M.A., Dip. Agr. Sci.
(Camb.), A.I.C.T.A.*Assistant Agricultural Officer:*

Zakaria bin Abdul Rauf.

*PAHANG—State Agricultural Officer:*H. M. James, M.C., Dip. Agr. (I.C.T.A.)
(*Acting*).*Assistant Agricultural Officers:**Pahang East—*

Wan Abdul Aziz bin Ungku Haji Abdullah

Pahang North—

Othman bin Mohd. Lela.

Pahang South—

Ahmad bin Jamal.

*Cameron Highlands:*N. Kanagaratnam, Agricultural Develop-
ment Officer-in-Charge.*NEGRI SEMBILAN—State Agricultural Officer:*

G. S. Keeping, B.Sc., Dip. Agr. Sci. (Camb.).

Assistant Agricultural Officer:

Saidin bin Dain.

MALACCA—Settlement Agricultural Officer:

H. D. Matheson, B.Sc., D.T.A. (Trin.).

Assistant Agricultural Officer:

Mhd. Yunus bin Mhd. Din.

JOHORE—State Agricultural Officer:

W. N. Scott, B.Sc., B. Agr., Ph.D., D.I.C.

*Agricultural Officers:**Johore South—*

Omar bin Buyong, B. Agric.

Johore Central—

P. Class, B.Sc. (Agr.), D.T.A. (Trin.).

Assistant Agricultural Officer:

Haji Abdul Rahman bin Mahmood, P.I.S.

*ON LEAVE:*H. K. Ashby, B.A., Dip. Agr. Sci. (Camb.),
A.I.C.T.A.P. A. Gething, M.A., Dip. Agr. Sci. (Camb.),
A.I.C.T.A.J. R. Milburn, B.Sc. (Dunelm), D.T.A.
(Trin.).AGRONOMY BRANCH*Senior Agronomist:*E. F. Allen, B.A., Dip. Agr. Sci. (Camb.),
A.I.C.T.A.*Agronomists:*

R. Henderson, M.C., B.Sc.

C. Whitehead, B.Sc. (Hort.), D.T.A. (Trin.).

B. C. Balbernie, B.Sc. (Agric.), D.T.A.
(Trin.).

Mohamad bin Jamil, B.Sc., D.I.C.T.A.

4 Vacancies.

Agricultural Engineers:

D. W. M. Haynes, B.Sc., A.M.I.B.A.E.

D. S. Boyce, B.Sc. (Agric.) (McGill), M.Sc.
(Dunelm).*Agricultural Officer (Livestock).*

(Vacant).

Statistician:

I. Watson, B.Sc. (Hons.).

Assistant Statistician:

Lee Yoke Heng.

Agricultural Development Officers:

J. A. Cox, A.M.I.B.A.E., Kedah.

A. Cumming, Serdang.

N. Kanagaratnam, Cameron Highlands.

1 Vacancy.

AGRICULTURAL EDUCATION BRANCH*Principal, College of Agriculture, Malaya:*O. M. Lee, A.I. Mech. E., A.I.N.A., F.L.S.
(On leave).*Senior Lecturers:*

J. Chattaway, B.Sc.

Mrs. M. Henderson, B.Sc. (Hons.), Dip.
Agr. Sci. (Cantab.) (*Temp.*).*Registrar and Bursar:*

Yap Chin Hee.

Assistant Lecturers:

Mohd. Rashid bin Ahmad.

G. R. Kurup, B.A. (Madras).

PUBLICATIONS BRANCH*Publications Officer:*

J. J. Holmes.

Librarian:

P. J. Verghese.

PUBLIC GARDENS*Horticultural Officer, Penang:*

H. Ritchings.



